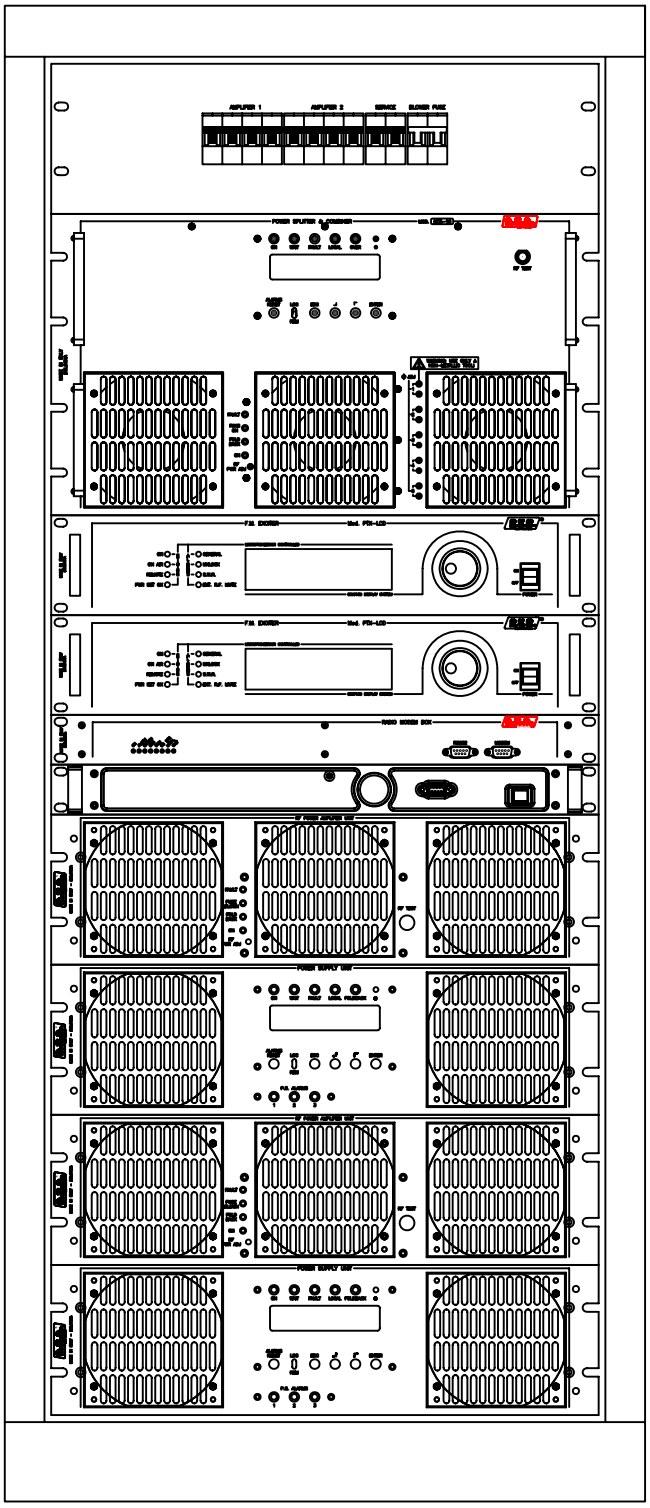
RACK FRONT VIEW



RACK 19" 27HE

DISTRIBUTION BOARD

HC2/5

EXCITER–M — PTX100–LCD/S

EXCITER–R — PTX100–LCD/S

RDMODWEB–FM.BN

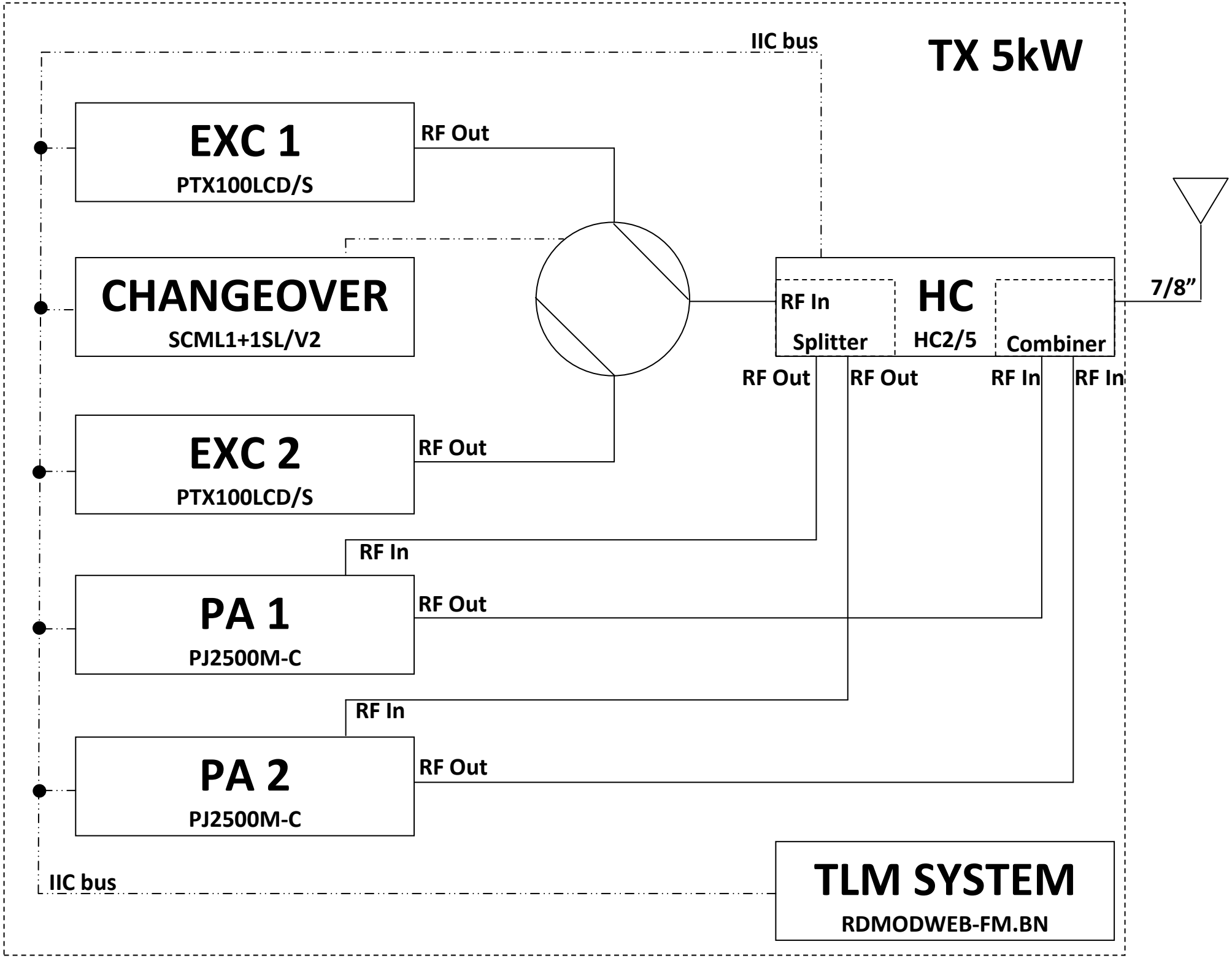
SCML1+1SL/V2

AMPLIFIER 1 — PJ2500M–C/PFC RF SECTION

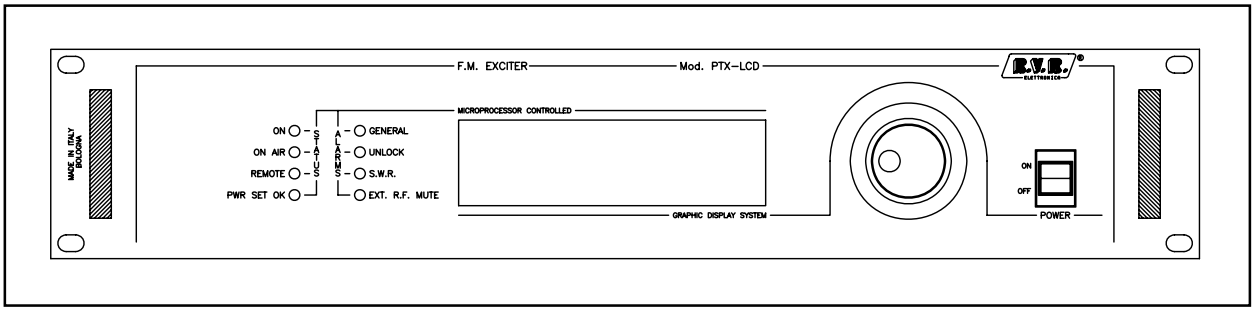
PJ2500M–C/PFC PS SECTION

AMPLIFIER 2 — PJ2500M–C/PFC RF SECTION

PJ2500M–C/PFC PS SECTION


TX 5kW
IIC bus
EXC 1
PTX100LCD/S
RF Out
CHANGEOVER
SCML1+1SL/V2
EXC 2
PTX100LCD/S
RF Out
HC
RF In
Splitter
HC2/5
Combiner
7/8”
RF Out
RF Out
RF In
RF In
RF In
PA 1
PJ2500M-C
RF Out
RF In
PA 2
PJ2500M-C
RF Out
IIC bus
TLM SYSTEM
RDMODWEB-FM.BN

PTX - LCD



User Manual

Volume 1

Manufactured by R.V.R. ELETTRONICA **Italy**

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Date: 31/08/2010

Revision History

Date	Version	Reason	Editor
07/05/04	0.0	New CPU 16 bit card	J. H. Berti
06/08/04	0.1	I.T.U. functionality addition	J. H. Berti
17/12/04	0.2	/GSM option addition and Software description upgrade	J. H. Berti
15/02/05	3.0	Upgraded Version	J. H. Berti
13/11/06	3.1	Remote Connector Description upgrade	J. H. Berti
24/07/07	3.2	Description upgrade of the jumper on panel card	J. H. Berti
31/08/10	3.3	Description upgrade of DARC input	J. H. Berti

PTX-LCD - User Manual
Version 3.3

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Notification of intended purpose and limitations of product use
This product is a FM transmitter intended for FM audio broadcasting. It utilises operating frequencies not harmonised in the intended countries of use.
The user must obtain a license before using the product in intended country of use. Ensure respective country licensing requirements are complied with.
Limitations of use can apply in respect of operating freuency, transmitter power and/or channel spacing.

Declaration of Conformity
Hereby, R.V.R. Elettronica SpA, declares that this FM transmitter is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.

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1. Preliminary Instructions

This manual is written as a general guide for those having previous knowledge and experience with this kind of equipment, well conscious of the risks connected with the operation of electrical equipment.

It is not intended to contain a complete statement of all safety rules which should be observed by personnel in using this or other electronic equipment.

The installation, use and maintenance of this piece of equipment involve risks both for the personnel performing them and for the device itself, that shall be used only by trained personnel.

R.V.R. Elettronica SpA doesn't assume responsibility for injury or damage resulting from improper procedures or practices by untrained/unqualified personnel in the handling of this unit.

Please observe all local codes and fire protection standards in the operations of this unit.

WARNING: always disconnect power before opening covers or removing any part of this unit.

Please observe all local codes and fire protection standards in the operations of this unit.

WARNING: this device can irradiate radio frequency waves, and if it's not installed following the instructions contained in the manual and local regulations it could generate interferences in radio communications.

This is a "CLASS A" equipment. In a residential place this equipment can cause hash. In this case can be requested to user to take the necessary measures.

R.V.R. Elettronica SpA reserves the right to modify the design and/or the technical specifications of the product and this manual without notice.

2. Warranty

Any product of **R.V.R. Elettronica** is covered by a 24 (twenty-four) month warranty.

For components like tubes for power amplifiers, the original manufacturer's warranty applies.

R.V.R. Elettronica SpA extends to the original end-user purchaser all manufacturers warranties which are transferrable and all claims are to be made directly to R.V.R. per indicated procedures.

Warranty shall not include:

1 Re-shipment of the unit to R.V.R. for repair purposes;

2 Any unauthorized repair/modification;

3 Incidental/consequential damages as a result of any defect;

4 Nominal non-incidental defects;

5 Re-shipment costs or insurance of the unit or replacement units/parts.

Any damage to the goods must be reported to the carrier in writing on the shipment receipt.

Any discrepancy or damage discovered subsequent to delivery, shall be reported to **R.V.R. Elettronica** within **5** (five) days from delivery date.

To claim your rights under this warranty, you shold follow this procedure:

1 Contact the dealer or distributor where you purchased the unit. Describe the problem and, so that a possible easy solution can be detected.

Dealers and Distributors are supplied with all the information about problems that may occur and usually they can repair the unit quicker than what the manufacturer could do. Very often installing errors are discovered by dealers.

2 If your dealer cannot help you, contact **R.V.R. Elettronica** and explain the problem. If it is decided to return the unit to the factory, **R.V.R. Elettronica** will mail you a regular authorization with all the necessary instructions to send back the goods;

3 When you receive the authorization, you can return the unit. Pack it carefully for the shipment, preferably using the original packing and seal the package perfectly. The customer always assumes the risks of loss (i.e., R.V.R. is never responsible for damage or loss), until the package reaches R.V.R. premises. For this reason, we suggest you to insure the goods for the whole value. Shipment must be effected C.I.F. (PREPAID) to the address specified by R.V.R.'s service manager on the authorization

DO NOT RETURN UNITS WITHOUT OUR AUTHORIZATION AS THEY WILL BE REFUSED

4 Be sure to enclose a written technical report where mention all the problems found and a copy of your original invoice establishing the starting date of the warranty.

Replacement and warranty parts may be ordered from the following address. Be sure to include the equipment model and serial number as well as part description and part number.

R.V.R. Elettronica SpA
Via del Fonditore, 2/2c
40138 BOLOGNA
ITALY
Tel. +39 051 6010506

3. First Aid

The personnel employed in the installation, use and maintenance of the device, shall be familiar with theory and practice of first aid.

3.1 Treatment of electrical shocks

3.1.1 If the victim is not responsive

Follow the A-B-C's of basic life support.

- Place victim flat on his backon a hard surface.
- Open airway: lift up neck, push forehead back (**Figure 1**).

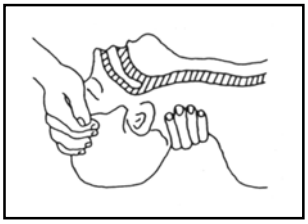


Figure 1

- clear out mouth if necessary and observe for breathing
- if not breathing, begin artificial breathing (**Figura 2**): tilt head, pinch nostrils, make airtight seal, four quick full breaths. Remember mouth to mouth resuscitation must be commenced as soon as possible.

Figura 2

- Check carotid pulse (**Figura 3**); if pulse is absent, begin artificial circulation (**Figura 4**) depressing sternum (**Figura 5**).

Figure 3

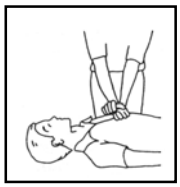


Figure 4

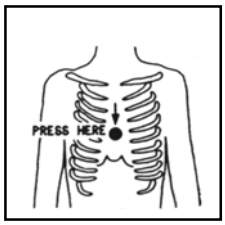


Figure 5

- In case of only one rescuer, 15 compressions alternated to two breaths.
- If there are two rescuers, the rythm shall be of one brath each 5 compressions.
- Do not interrupt the rythm of compressions when the second person is giving breath.
- Call for medical assistance as soon as possible.

3.1.2 If victim is responsive

- Keep them warm.
- Keep them as quiet as possible.
- Loosen their clothing (a reclining position is recommended).
- Call for medical help as soon as possible.

3.2 Treatment of electrical Burns

3.2.1 Extensive burned and broken skin

- Cover area with clean sheet or cloth.
- Do not break blisters, remove tissue, remove adhered particles of clothing, or apply any salve or ointment.
- Treat victim for shock as required.
- Arrange transportation to a hospital as quickly as possible.
- If arms or legs are affected keep them elevated.

If medical help will not be available within an hour and the victim is conscious and not vomiting, give him a weak solution of salt and soda: 1 level teaspoonful of salt and 1/2 level teaspoonful of baking soda to each quart of water (neither hot or cold).

Allow victim to sip slowly about 4 ounces (half a glass) over a period of 15 minutes.

Discontinue fluid if vomiting occurs.

DO NOT give alcohol.

3.2.2 Less severe burns

- Apply cool (not ice cold) compresses using the cleansed available cloth article.
- Do not break blisters, remove tissue, remove adhered particles of clothing, or apply salve or ointment.
- Apply clean dry dressing if necessary.
- Treat victim for shock as required.
- Arrange transportation to a hospital as quickly as possible.
- If arms or legs are affected keep them elevated.

4. General Description

The **PTX-LCD** is an FM exciter featuring a 19" RACK-mountable form factor. It uses an 87.5 to 108 MHz frequency band, with 10 kHz steps. Other frequency ranges are available on request.

The **PTX-LCD** output power ranges from 0 W up to 30, 60 or 100 W for the **PTX30LCD**, **PTX60LCD** and **PTX100LCD**, respectively.

The **PTX-LCD** is available in a version with incorporated stereo coder (identified by code “/S”) or in a MONO/MPX version. The MONO/MPX model may be used for mono or stereo transmission using an external stereo coder.

User interface consists of a graphic liquid crystal display and a knob (encoder). This interface lets you view all parameters relating to machine operation and adjust settable parameters (e.g.: power level or operating frequency).

The exciter has been designed to easily integrate into complex transmission systems. To this end, it is capable of accepting data from, controlling or interacting with external equipments, such as amplifiers, switching units, relays or other exciters.

The **PTX-LCD** design is based on a modular concept: the different functions are performed by modules that are connected directly through male and female connectors or through flat cables terminated by connectors. This design facilitates maintenance and module replacement.

The **PTX-LCD** supports remote alarm monitoring by sending SMS alarm messages and receiving SMS commands through an external or integrated GSM modem (option /GSM).

Alarms can be activated for the following parameters:

- **PTX-LCD** output power (FWD);
- **PTX-LCD** reflected power (RFL);
- External forward power of an amplifier or coupler with protection card (E.FWD);
- External reflected power of an amplifier or coupler with protection card (E.RFL);
- Audio signal missing;
- MAINS failure (available when the **PTX-LCD** is connected to an UPS unit).
- up to 8 customised alarms can be programmed when the optional telemetry card is installed

The management software offers an intuitive user interface and runs on any PC in the WINDOWS™ environment.

5. Quick Guide - Installation and Use

This chapter gives a concise view of the points that are necessary for the installation of the device. If any item is not completely clear, for example when you use the exciter for the first time, we strongly suggest to read throughly the manual and the description of the operating system.

5.1 Using the encoder

The interaction between the user and the exciter's control software is performed using the encoder (fig. 5.1).

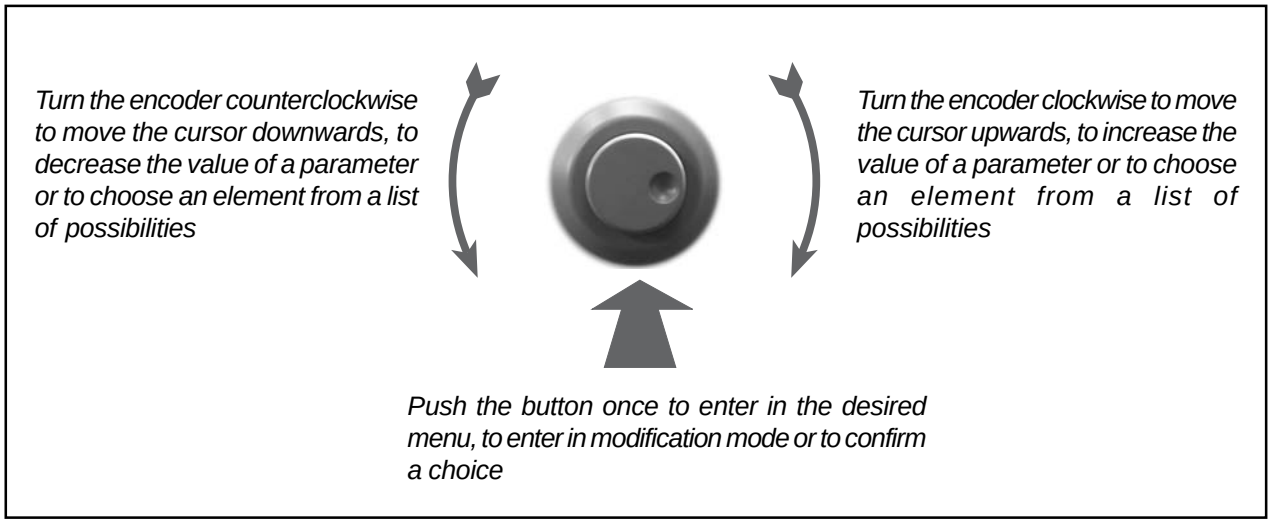

Turn the encoder counterclockwise to move the cursor downwards, to decrease the value of a parameter or to choose an element from a list of possibilities
Turn the encoder clockwise to move the cursor upwards, to increase the value of a parameter or to choose an element from a list of possibilities
Push the button once to enter in the desired menu, to enter in modification mode or to confirm a choice

Figure 5-1

The operations that can be performed on the encoder are:

- **rotation**: moves the cursor shown on the display; if you turn the encoder to the left (counterclockwise), the cursor moves downwards, if you turn it right the cursor moves upwards; it also permits to increase or diminish the parameters (turning the encoder left diminishes the parameter, turning it right increases it) or to select an item form a list of options.
- **pushing**: push the button once when the cursor is on the name of a menu to enter in that menu, push it when the corsor is on the name of a parameter to enter in modification mod (the cursor starts blinking); after the modification of a parameter, push the button to save the new value.

After having modified the value of a parameter, the cursor goes on blinking for approximately 30 seconds, waiting for confirmation from the user. If the user doesn't confirm the new value (i.e., the button is not pressed), the device emits a sound to indicate that no modification has been saved; the cursor stops blinking and remains on the selected parameter.

5.2 Preparation

Unpack the transmitter and before any other operation check the unit for any shipping damage and check that all the controls and connectors on the front and rear panels are in good conditions.

Check the mains voltage selector on the rear panel: the selected value is indicated by an arrow. If required, extract the selector block levering with a little screwdriver (Fig. 5-2). Rotate the block until the correct printed value corresponds with the arrow, then reinsert it.

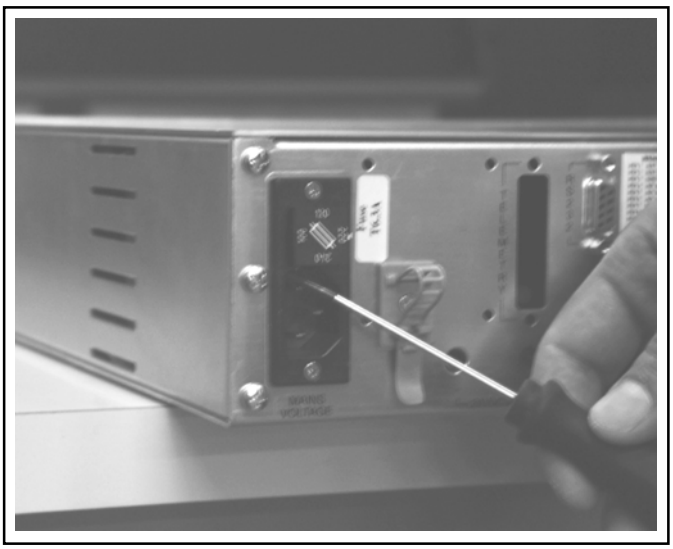


Figure 5-2

If it has been necessary to change voltage, check the fuse value. The required values are the following:

PTX30-LCD	$230V_{AC}$ ±10% - 3,16 A (6x30) $115V_{AC}$ ±10% - 6,30 A (6x30)
PTX60-LCD	230 V_{AC} ±10% - 6,30 A (6x30) $115V_{AC}$ ±10% - 10,0 A (6x30)
PTX100-LCD	230 V_{AC} ±10% - 6,30 A (6x30) $115V_{AC}$ ±10% - 10,0 A (6x30)

It is also possible to check the integrity of the RF amplifier section fuse: Its value is 4A for the **PTX30-LCD** version and 8A for the **PTX60-LCD** and **PTX100-LC**D versions.

Verify that the mains switch on the front panel of the unit is on the OFF position.

Connect to the RF output of the exciter a proper load (a dummy load with suitable dissipation power, an antenna, a final amplifier or a combiner).

NOTE: When you connect the **PTX-LCD** to other devices, it is necessary to strictly follow the instructions given by the resepective manufacturers, to avoid damages or danger situations.

Connect the mains cable to the plug on the rear of the exciter.

NOTE: This device shall be correctly connected to ground.
Correct grounding is essential both for safety and to reach the rated performances.

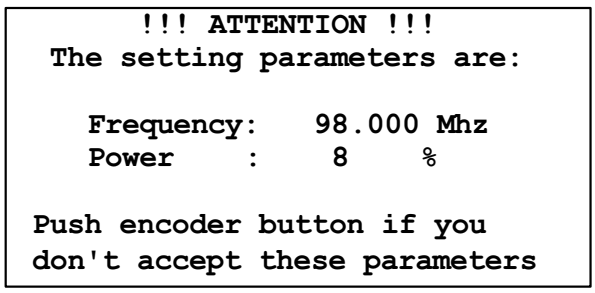
Connect your source audio (for example the mixer or STL output) to the suitable input connector. Depending on the version, the **PTX-LCD** offers a number of input choices, L+R, MPX or even digital; see the connectors description for details.

5.3 Operation

Switch on the exciter with the mains switch on the front panel.

All the STATUS and ALARMS leds are lit on to permit the verification of their good working status. The display than shows some information regarding the exciter.

After a few seconds, an intermittent beep and a display message prompt the user to push the button if operating parameters are not acceptable.



Pushing the button places the transmitter in standby mode, which provides full operation, but disables RF power output.

If the button is not pushed, the start-up sequence will continue.

The transmitter stores set parameters in a non volatile memory so that the correct configuration is retained upon power-off.

When settings are not correct, as may be the case on first power-on, or need to be changed for some reason before beginning transmission, the transmitter may be placed in standby mode as mentioned above.

This is only necessary when you wish to change machine settings before beginning transmission.

The **PTX-LCD** menu system (see Section 7) enbles the user to control all operating parameters of the machine.

Before enabling exciter power output, check the following key parameters and adjust as required:

- frequency
- power
- audio input level
- audio input impedance
- preemphasis
- audio input type (depending on version, MONO or MPX; or MONO, MPX_U, MPX_B, STEREO, DARC)
- if in STEREO mode, ensure that pilot tone is active

If RF power output was disabled, you may now enable it from the MAIN menu as follows: select the first item and change setting from OFF to ON.

The RF power output of the **PTX-LCD** may be disabled from the main menu at any time.

During machine operation, all available parameters can be viewed or edited using the menu system.

5.4 Calibration

The **PTX-LCD** trimmers can be accessed from the rear panel and can be adjusted by the user. There are two EXT AGC (FWD and RFL) trimmers and the LEVEL ADJ trimmers (Fig. 6-2 [16]).

The LEVEL ADJ trimmers are used to control modulation levels to the matching inputs. Audio input levels are adjusted via software in 1 dB steps and the trimmers are used for fine tuning.

For SCA input levels, only trimmer adjustment is available.

The EXT AGC trimmers enable the user to limit exciter output power according to the levels reached by two analogue quantities acquired through the Remote connector.

The two trimmers use the same mode of operation: EXT AGC - FWD is connected to pin 10 of the Remote connector, whereas EXT AGC-RFL is connected to pin 2. If voltage at either of the pins exceeds the threshold set at the matching trimmer, exciter output power is reduced until the monitored quantity drops below the set limit.

These trimmers are very useful when the exciter is part of a transmission system. For example, assuming that the **PTX-LCD** is connected to a power amplifier, a proportional signal may be linked to amplifier output power at pin 10 and another proportional signal may be linked to reflected power at pin 2. This way, power is kept steady at varying operating frequencies even though amplifier gain is variable and reflected power limitation is achieved for the whole system without triggering amplifier protection equipments.

The calibration procedure for the EXT AGC trimmers of **PTX-LCD** in a configuration with power amplifier is described below.

Perform the connections shown in figure 5-3. The cable to connect the two equipments is available from R.V.R. Elettronica on request, or the user may ask a skilled technician to provide a cable to match the pinout of the amplifier used.

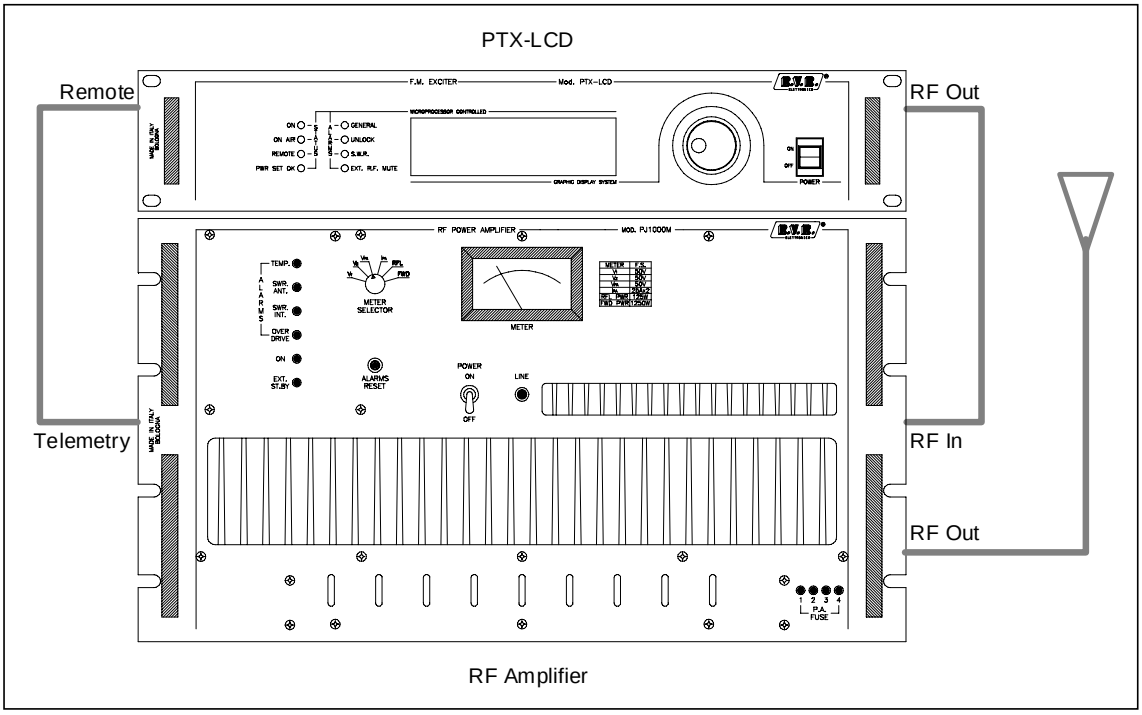


Figure 5-3

Switch on amplifier and exciter set to minimum power.

Turn both trimmers fully anticlockwise.

Gradually increase exciter output power until the forward power reading on the amplifier meter is just below the desired threshold.

Turn the EXT AGC - FWD trimmer clockwise until the reading of amplifier output power begins to decrease.

Set exciter power to minimum setting.

Disconnect the dummy load from the amplifier and replace it with a mismatch load so that part of the output power is reflected back and set amplifier meter to measure reflected power.

Gradually increase exciter output power until the reflected power reading on the amplifier meter is just above the desired threshold.

Turn the EXT AGC - RFL trimmer clockwise until the reading of amplifier reflected power begins to decrease.

The trimmer calibration procedure is completed. Thanks to this system, the user may choose the preferred power setting at the exciter, while amplifier forward and reflected power remains within the set thresholds.

6 External Description

This section describes the components found on the front and rear panel of **PTX-LCD**.

6.1 Front Panel

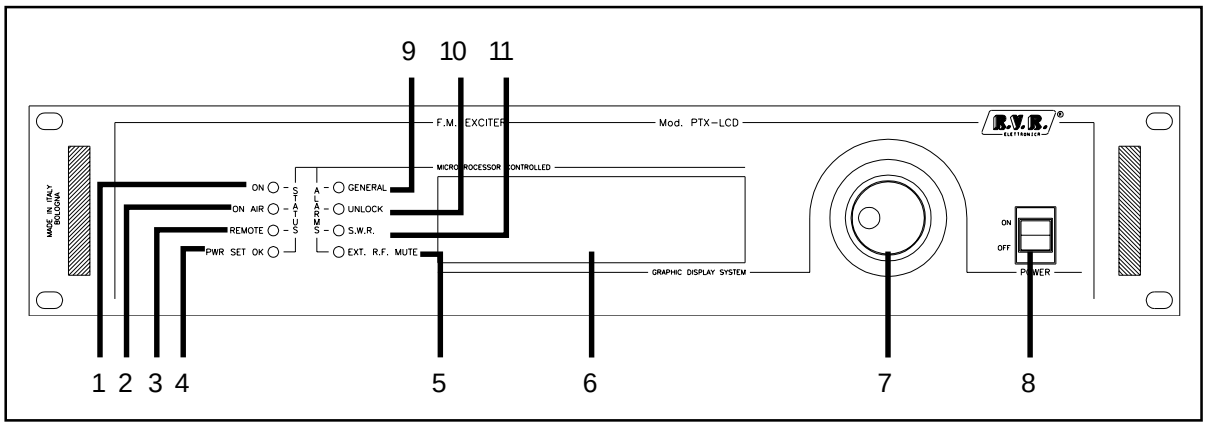


Figure 6-1

[1]	ON	Indicates that exciter is switched on
[2]	ON AIR	Exciter is delivering output power (is on air)
[3]	REMOTE	Exciter is controlled by an external system
[4]	PWR SET OK	steady on - Exciter is delivering the set output power flashing: exciter did not reach set power due to external factors
[5]	EXT RF MUTE	Exciter is not delivering power because inhibited by an interlock
[6]	DISPLAY	Liquid Crystal Display, supports both graphics (240x64 pixels) and text (30x8 characters)
[7]	ENCODER	Software control knob and button
[8]	POWER	Mains power switch
[9]	GENERAL	Indicates transmitter failure in the event of alarms
[10]	UNLOCK	PLL not yet locked to set frequency
[11]	SWR	Transmitter blocked due to exceeding SWR

6.2 Rear Panel

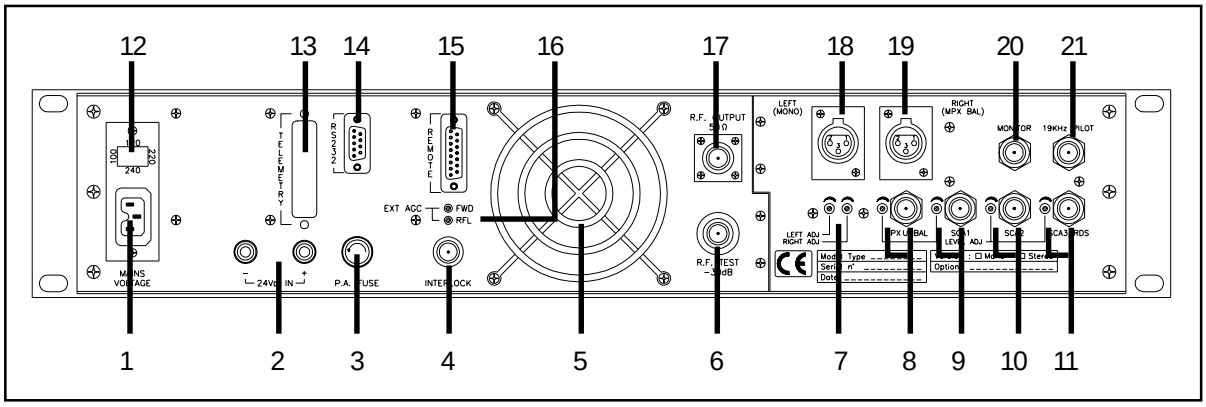
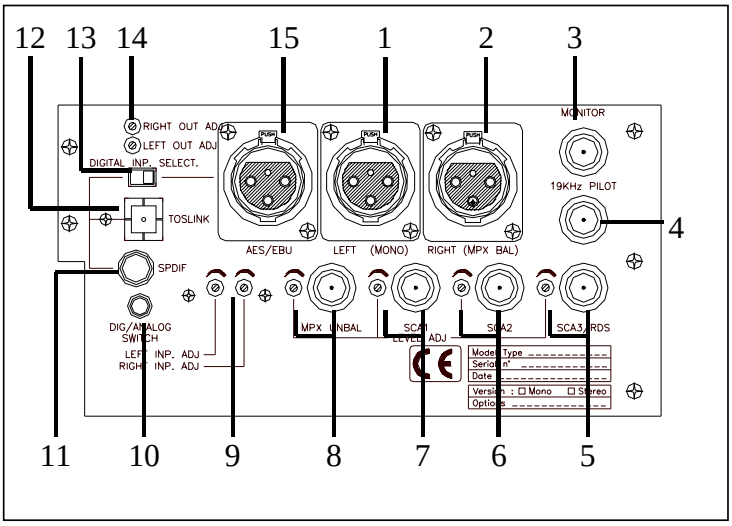


Figure 6-2

[1]	PLUG	Mains power plug
[2]	24Vdc IN	Connectors for external 24V power supply (option). Positive (red) and negative (black)
[3]	P.A. Fuse	Protection fuse of RF final stage
[4]	INTERLOCK	Interlock BNC connector: when central conductor is connected to ground, the transmitter is placed into forced standby mode
[5]	VENTOLA	Forced cooling fan
[6]	RF Test	Test output at -40 dB with respect to output level
[7]	LEVEL ADJ	Trimmers for Left and Right input level adjustment
[8]	MPX Unbal	Unbalanced MPX input BNC connector with level trimmer
[9]	SCA1	BNC connector for SCA1 input with level trimmer
[10]	SCA2	BNC connector for SCA2 or DARC input with level trimmer
[11]	SCA3/RDS	SCA3/RDS BNC connector for SCA3/RDS input with level trimmer
[12]	FUSE	Power supply fuse and voltage selection block
[13]	Telemetry	DB25 connector of telemetry card (option)
[14]	RS232	DB9 connector for direct serial communication or modem
[15]	Remote	DB15 connector for interface to remote devices
[16]	EXT AGC	Trimmer for automatic gain control based on external signals
[17]	RF Output	N connector for RF output
[18]	Left (mono)	XLR connector for left / mono audio channel input
[19]	Right (MPX)	XLR connector for right / MPX audio channel input
[20]	Monitor	BNC connector for VCO section input signal monitoring
[21]	19 kHz pilot	Pilot tone output BNC connector, may be used to synchronise external devices such as RDS coder

6.3 Rear Panel - AUDINP-DIG option



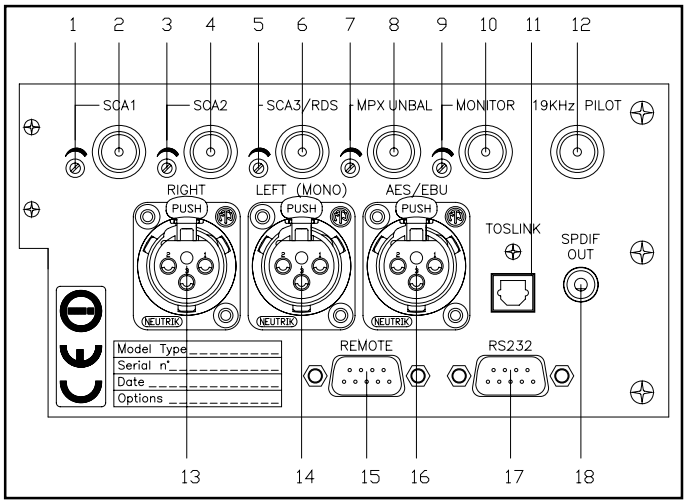
Analogue section

[1]	Left (Mono)	XLR connector for Left / mono input
[2]	Right (MPX BAL)	XLR connector for Right / MPX input
[3]	Monitor	BNC connector for composite signal monitoring
[4]	19 kHz pilot	BNC connector for output tone control, may be used to synchronise external devices (such as RDS coder)
[5]	SCA3/RDS	SCA3/RDS BNC connector, with level trimmer
[6]	SCA2	SCA2 BNC connector, with level trimmer
[7]	SCA1	SCA1 BNC connector, with level trimmer
[8]	MPX Unbal	Unbalanced MPX BNC connector, with input with level trimmer
[9]	Level INP ADJ	Trimmers for Left and Right input adjustment

Digital section

[10]	Dig/Analog switch	3.5 mm JACK, connector for external Digital/Analogue command
[11]	SPDIF	Unbalanced PIN/RCA connector for S/PDIF audio input
[12]	TOSLINK	Fibre optic digital audio input connector
[13]	Digital Imp. Select	Switch for balanced or unbalanced digital audio input selection
[14]	Level OUT ADJ	Trimmer for Left and Right level adjustment of converted digital audio signal
[15]	AES/EBU	Balanced XLR connector for AES/EBU digital audio input

6.4 Rear Panel - TRDSP option



[1]	SCA1	Input connector, BNC type
[2]	SCA1 lvl.	SCA1 level trimmer
[3]	SCA2	SCA2 input connector, BNC type
[4]	SCA2 lvl.	SCA2 level trimmer
[5]	SCA3/RDS	SCA3/RDS input connector, BNC type
[6]	SCA3/RDS lvl.	SCA3/RDS level trimmer
[7]	MPX UNBAL	Unbalanced MPX input connector, type BNC
[8]	MPX UNBAL lvl.	MPX UNBAL level trimmer
[9]	MONITOR	BNC connector for VCO section input signal monitoring
[10]	MONITOR lvl.	MONITOR level trimmer
[11]	TOS-LINK	Fibre optic digital audio input connector
[12]	19 kHz pilot	BNC connector for output tone control, may be used to synchronise external devices (such as RDS coder)
[13]	Right	Right input connector, type XLR
[14]	Left	Left input connector, type XLR
[15]	Remote	DB15 connector for interface to remote devices
[16]	AES/EBU	Balanced XLR connector for AES/EBU digital audio input
[17]	RS232	DB9 connector for direct serial communication or modem
[18]	SPDIF	Unbalanced PIN/RCA connector for S/PDIF audio input

6.5 Rear Panel - GSM option

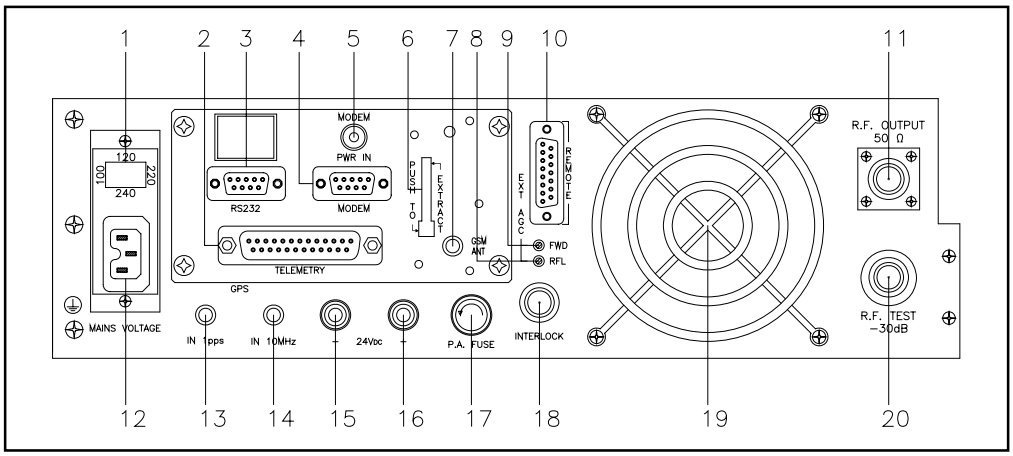


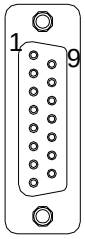
Figure 6-3

[1]	FUSE	Power supply fuse and voltage selection block
[2]	TELEMETRY	DB25 connector of telemetry card (option)
[3]	RS232	DB9 connector for direct serial communication or modem
[4]	MODEM	DB9 connector connected to GSM modem
[5]	SUPPLY GSM	Power supply plug of GSM modem
[6]	SIM SLOT-IN	GSM card slot. Press button to extract card from slot.
[7]	GSM ANT	SMA connector for GSM Antenna
[8]	RFL	Trimmer for automatic gain control based on reflected power
[9]	RFL	Trimmer for automatic gain control based on reflected power
[10]	REMOTE	DB15 connector for interface to remote devices
[11]	RF Output	N connector for RF output
[12]	PLUG	Mains power plug
[13]	IN 1PPS	Reserved for future implementations
[14]	IN 10MHz	Sync signal input BNC connector for external devices
[15]	24Vdc IN +	Connectors for external 24V power supply (option). Positive (red)
[16]	24Vdc IN -	Connectors for external 24V power supply (option). Negative (black)
[17]	P.A. Fuse	Protection fuse of RF final stage
[18]	INTERLOCK	Interlock BNC connector: when central conductor is connected to ground, the transmitter is placed into forced standby mode
[19]	FAN	Forced cooling fan
[20]	RF Test	Test output at -30 dB with respect to output level

6.6 Connectors description

6.6.1 Remote

Type: Female DB15

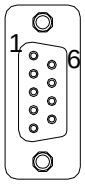


1 Ext Rem - Interlock input, disables tx if connected to ground
2 Ext Rfl Pwr - Analogue input (Max. $2V_{DC}$) for reflected power from external amplifier
3 GND
4 Analogue Input 5 or I^2C bus SDA *
5 Analogue Input 3
6 Analogue Input 1
7 RLY 2 Out - Digital output. Normally open relay contact; it is closed to ground according to a preset on/off time when exciter state changes from ON to OFF. If the ExPwr menu is disabled (see 11.7), the states of this contact have the following meanings: closed = Power Good; open = alarm.
8 GND
9 GND
10 Ext Fwd Pwr - Analogue input (Max. $2V_{DC}$) for forward power from external amplifier
11 Analogue Input 6 or I^2C bus SCL *
12 Analogue Input 4
13 Analogue Input 2
14 GND
15 RLY 1 Out - Digital output. Normally open relay contact; it is closed to ground according to a preset on/off time when exciter state changes from OFF to ON. If the ExPwr menu is disabled (see 11.7), this contact serves as a "AUDIO alarm": closed = Alarm; open = OK.

* : the function is determined by jumper JP10 on the power supply card. When jumper JP10 is ON, PIN4 is the FAULT signal input (see Sect. 13.12.1.5), whereas PIN11 is the MAINS FAULT signal input.

6.6.2 RS 232

Type: Female DB9



1 NC
2 TX_D
3 RX_D
4 NC
5 GND
6 +12V
7 NC
8 CTS
9 NC

Note: Normally, **PTX-LCD** serial communication is configured as DCE (Data Communication Equipment).

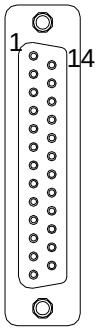
6.6.3 Left (MONO) / Right (MPX Bal)

Type: female XLR

1 GND
2 Positive
3 Negative

6.6.4 Telemetry “SLTELEM00001” Opt.

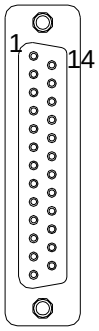
Type: Female DB25



1 GND
2 +12V
3 NC
4 relay 1, normally closed contact
5 relay 2, common contact
6 IIC clock
7 IIC data
8 open collector output
9 telemetry analogue input 1
10 telemetry analogue input 3
11 telemetry analogue input 5
12 telemetry analogue input 7
13 GND
14 GND
15 relay 1, normally opened contact
16 relay 1, common contact
17 relay 2, normally opened contact
18 relay 2, normally closed contact
19 GND
20 GND
21 GND
22 telemetry analogue input 2
23 telemetry analogue input 4
24 telemetry analogue input 6
25 telemetry analogue input 8

6.6.5 Telemetry “SLTELEM00002” Opt.

Type: Female DB25



1	N.C.
2	Audio Auto (Meldung)
3	GND
4	Audio Auto (Kommando)
5	Audio Digital (Meldung)
6	N.C.
7	GND
8	ON (Kommando)
9	Power Good 1 (Meldung)
10	Warten (Meldung)
11	Audio Digital (Kommando)
12	Off (Meldung)
13	RF Enable (Kommando)
14	SWR (Meldung)
15	Reserved
16	Audio Analogue (Kommando)
17	Fault (Meldung)
18	Audio Alarm (Meldung)
19	Reserved
20	Off (Kommando)
21	GND
22	Power Good 2 (Meldung)
23	Local (Meldung)
24	+Vout
25	On (Meldung)

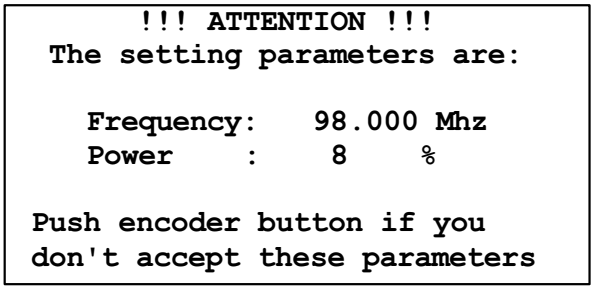
7. Operating System

The exciter is controlled by a microprocessor system. Software operations may be grouped into two broad categories: start-up and normal operation.

7.1 Start-up

Upon switch-on, a window that holds machine information appears on the display. Label "CCIR" identifies the set of default values the machine will revert to in the event the software is reinitialised. There are different sets of default values; see section 11 for a detailed description.

After 10 seconds, a new window appears with an intermittent beep signal.



Pressing the encoder while this screen is displayed disables exciter power output. This way, the user may make any necessary changes to operating parameters before beginning transmission.

If no controls are operated during 5 seconds, or if the encoder is pressed, the exciter goes to the main screen (MAIN).

7.2 Operating System

The **PTX-LCD** menu system consists of a default menu and set of administration menus.

The figure below provides an overview of the menu system.

RF Status (Main)

RF Amplifier (Ampli)

Power Supply (Suppl)

External Power (ExPwr)

External Status (Exsts)

External Frequency (ExFrq)

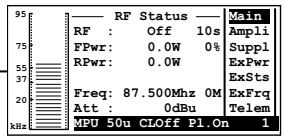
SCA/RDS (SCA)

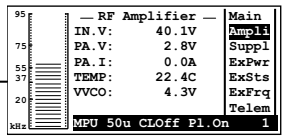
Telemetry (Telem)

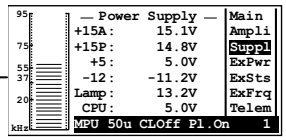
TLC/TLS (TC/TS)

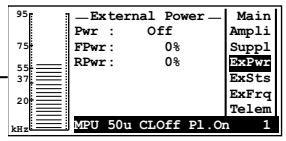
Audio Set (Auset)

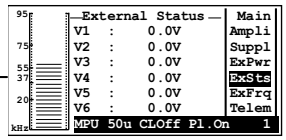
IAMLC (IAMLC)

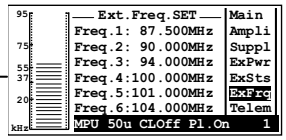


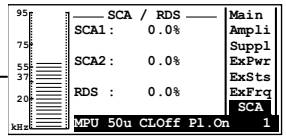


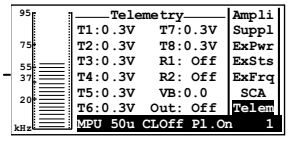


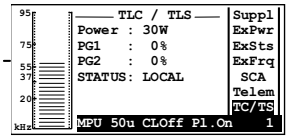


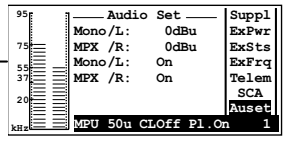


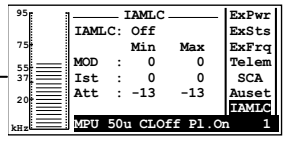








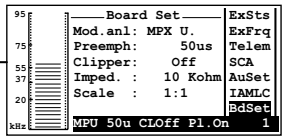




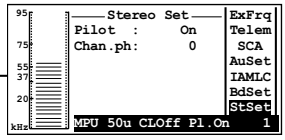
STANDARD MENU

TLM OPT. STD. MENU

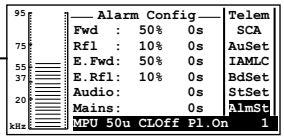
Board Set (BdSet)



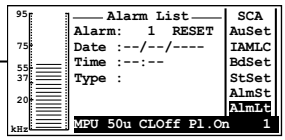
Stereo Set (StSet)



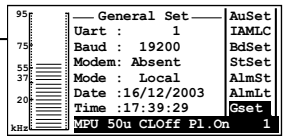
Alarm Config (AlmSt)



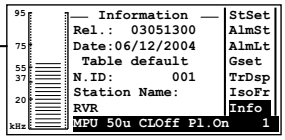
Alarm List (AlmLt)



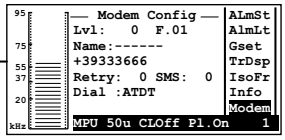
General Set (GSet)



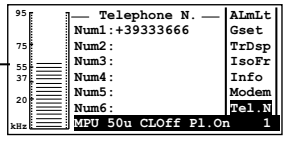
Information (Info)



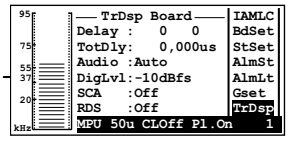
Modem Config (Modem)



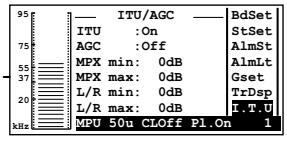
Telephone N. (Tel.N)



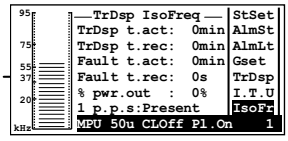
TrDsp Board (TrDsp)



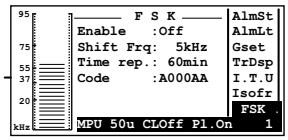
ITU/AGC (I.T.U.)



TrDsp Isofreq (Isofreq)



FSK (FSK)



7.2.1.2 Status Bar

This "status bar" relates to certain settings that can be modified from the administration submenus; these settings are discussed in greater detail further below.

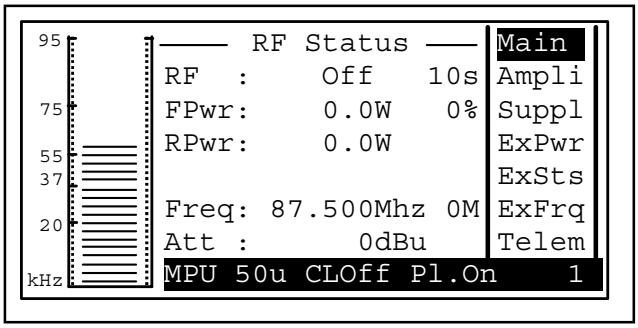
- `STE 50u CL.On Pl.On 001`

`Ste`	Audio operating mode: Stereo/Mono/MPX_U/MPX_B
`50u`	Preemphasis: 0, 25, 50, 75 microseconds
`Cl`	Clipper feature, On or Off
`Pl`	Pilot tone transmission, On or Off
`001`	Machine address (from 001 to 200), relevant when machine is integrated into a telemetry transmission system.

Turning the encoder moves the cursor to the next submenu label, while its content appears in the centre of the window.
If the encoder is pressed when a menu indicator is highlighted on the navigation bar, and that menu contains editable parameters, the cursor jumps into the window in the centre of the display to enable editing.
All menus of this type contain an "EXIT" field: press the encoder when this field is highlighted to exit the submenu and return to navigation mode.

7.2.2 Administration menu

7.2.2.1 RF Status



`RF` RF power output On / Off. Reading and setting of time taken by the **PTX-LCD** to reach set power; setting range 1 to 100s

`FPwr` Output power reading and setting. Reading is expressed in Watts, whereas setting is a percentage of maximum power. If the encoder is pressed when the cursor is on this option, measurement unit label changes from "W" to "%" and the desired percentage can be set by turning the encoder. Press the encoder to store the new setting.

`RPwr` Reflected power reading in watts.

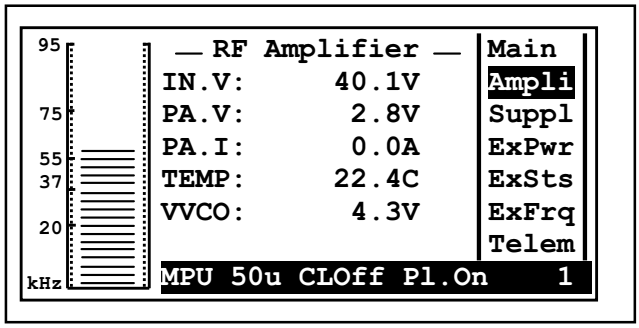
`0%` Output power setting in percent

`Freq` Operating frequency. Press the encoder when this parameter is highlighted and then turn the encoder to change frequency value. When the encoder is pressed to store the new frequency setting, the software will prompt for a confirmation ("`Are you sure?`"). Highlight "`Yes`" and press the encoder to confirm the new frequency setting or select "`No`" to abandon change. Value "`0M`" near the MHz indication identifies the current frequency selection (set from menu "ExFrq") in the event the frequency switching feature is on (switching occurs based on the voltage present at connector DB15).

`Att` Gain set at audio inputs.

7.2.2.2 RF Amplifier

This is an information screen; it shows amplifier voltage, current and temperature values, which cannot be modified.



`IN.V` Power supply input voltage

`PA.V` Voltage applied to final stage of amplifier

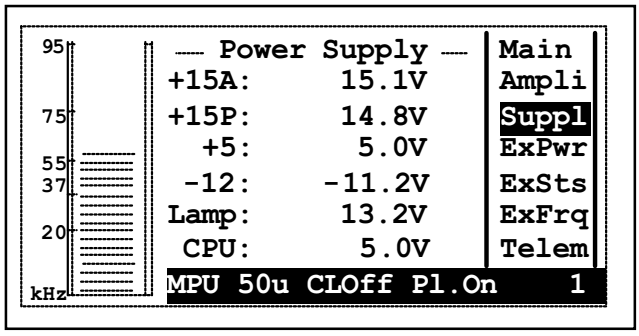
`PA.I` Current applied to final stage of amplifier

`TEMP` amplifier module temperature

`VVCO` Voltage applied to VCO section

7.2.2.3 Power Supply

This is an information screen showing the different voltages supplied by the amplifier:



`+15A` Main supply voltage to audio, pll, coder circuits; it is reduced to 8 Volts on the MAIN AUDIO BOARD.

`+15P` Supply voltage to control logic panel.

`+5` Voltage in power supply digital circuits.

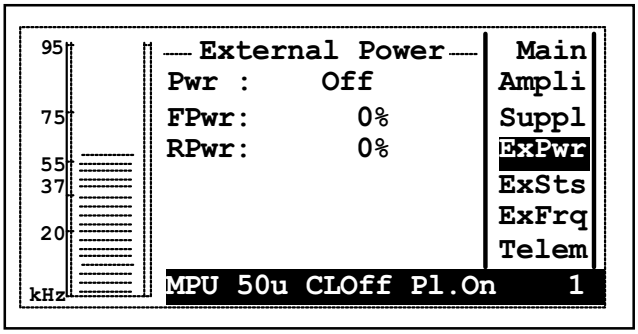
`-12` Negative voltage of main power supply.

`LAMP` Display lamp supply voltage; typically, 13 Volts.

`CPU` CPU supply voltage.

7.2.2.4 External Power

External amplifier control menu.
This menu may or may not be available, depending on machine jumper settings (see 11.7.1). Use of this menu requires certain power amplifier features (amplifier may be turned on and off by opening a contact and is capable of providing proportional voltages to forward and reflected power).



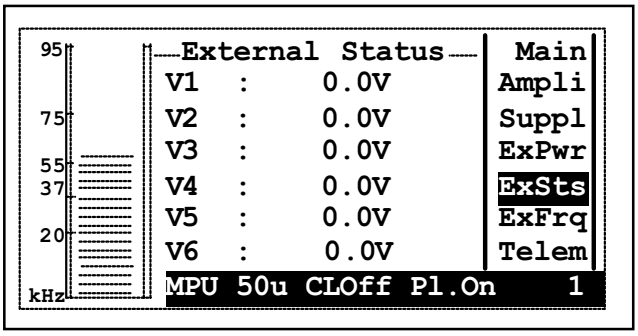
PWR Status indicator, command relates to the **PTX-LCD** mode (MAIN menu).

FPWR Forward power supplied by external amplifier expressed in percent.

RPWR Reflected power supplied by external amplifier expressed in percent.

7.2.2.5 External Status

Monitoring menu for input voltages from a telemetry-equipped equipment.
This menu may or may not be available, depending on machine jumper settings (see 11.7.1).



V1 Input voltage at pin 6 of REMOTE connector expressed in Volts (max 5 Volts).

V2 Input voltage at pin 13 of REMOTE connector expressed in Volts (max 5 Volts).

V3 Input voltage at pin 5 of REMOTE connector expressed in Volts (max 5 Volts).

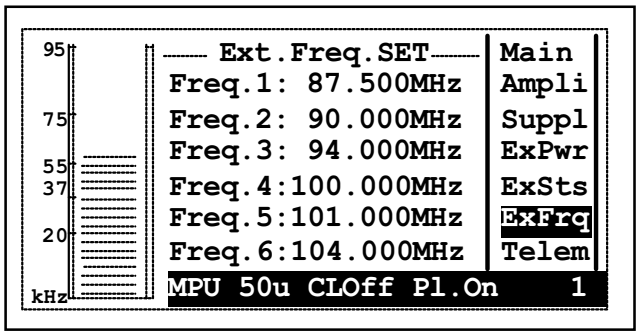
V4 Input voltage at pin 12 of REMOTE connector expressed in Volts (max 5 Volts).

V5 Input voltage at pin 4 of REMOTE connector expressed in Volts (max 5 Volts).

V6 Input voltage at pin 11 of REMOTE connector expressed in Volts (max 5 Volts).

7.2.2.6 Ext. Freq. SET

Frequency switching menu, switching is based on voltage present in previous menu. This menu may or may not be available, depending on machine jumper settings (see 11.7.1).

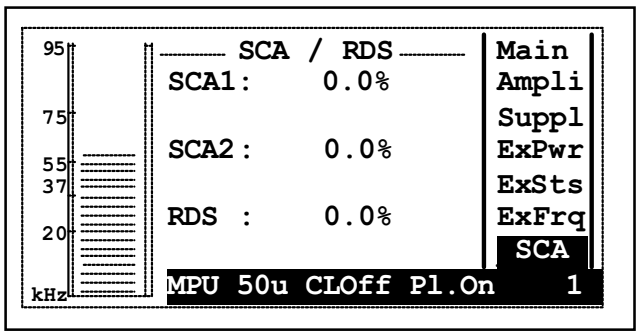


Freq 1 Default service frequency

Freq 2-6 Service frequencies of transmitters 2-6

7.2.2.7 SCA / RDS

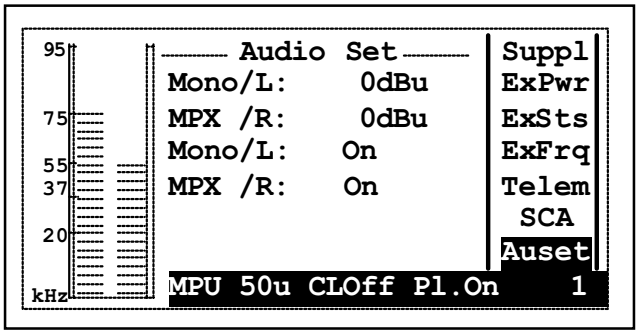
This menu shows the modulation levels achieved by the SCA and RDS inputs in the **PTX-LCD**.



The **PTX-LCD** has three subcarrier transmission inputs named SCA1, SCA2 and RDS. This menu shows the modulation level achieved by each input both in kHz and in percent.

7.2.2.8 Audio Set

Audio settings: channels on/off and level adjustment.



MONO/L Setting of audio input level on MONO channel (left channel if stereo version). It is adjusted in 1 dBu steps in a -13 to +14 dBu range. If parameter is set to X dBmu, the system generates a 75 kHz deviation for an X dBu input.

MPX/R Setting of audio input level on MPX channel (right channel if stereo version). It is adjusted in 1 dBu steps in a -13 to +14 dBu range. Set level has the same meaning as for the first channel.

MONO/L Software switch to set MONO channel On / Off (left channel if stereo version).

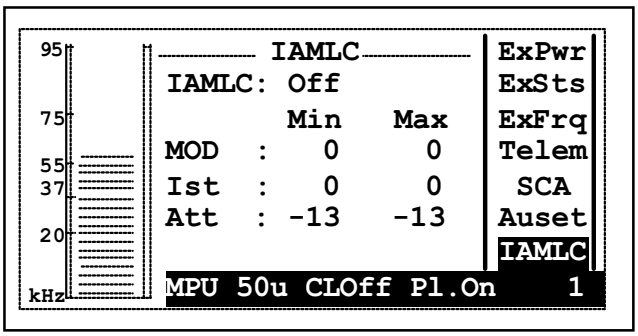
MPX/R Software switch to set MPX channel On / Off (right channel if stereo version).

When the exciter is placed in STEREO mode from the BdSet menu (for stereo version), the same level adjustment is forced on both channels.

7.2.2.9 IAMLC

Intelligent Automatic Modulation Level Control.

NOTE: If the machine is not equipped with the optional TRDSP card, this menu is not displayed.



The IAMLC feature of the **PTX-LCD** controls modulation level by adjusting input level without the use of limiters or compressors.

When mean modulation remains over the set maximum threshold for a period of time greater than set maximum hysteresis time, input level is attenuated by 1 dB. Likewise, when mean modulation remains under the set minimum threshold for period of time greater than set minimum hysteresis time, input level is boosted by 1 dB. The maximum limits for automatic control attenuation and boost are user-selectable. Listed below are the menu elements:

`IAMLC` Function enable/disable

`Mod` Minimum and maximum threshold for IAMLC operation

`Ist` Operation time at minimum threshold and at maximum threshold

`Att` Minimum and maximum operation limit

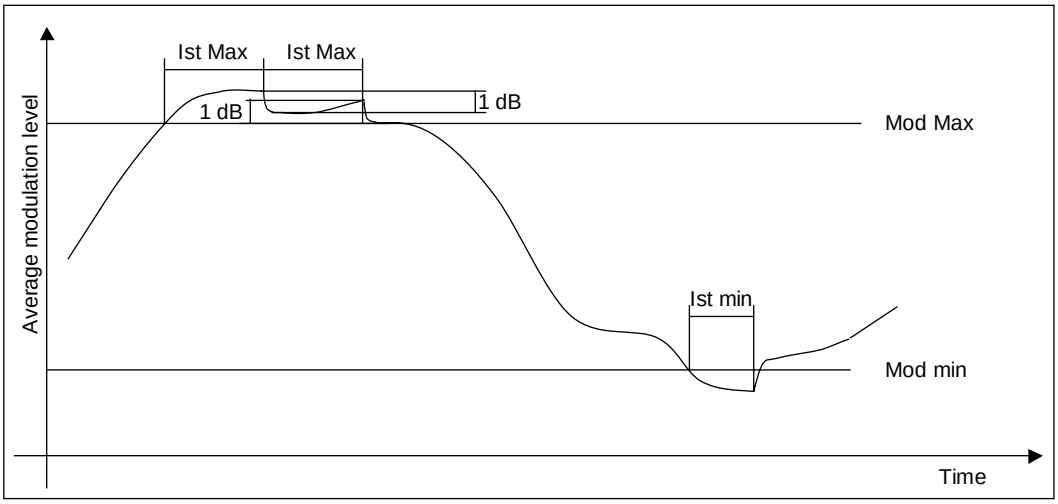
The recommended settings for different type of music programmes are listed in the following table:

Radio Program	Mod Min	Mod Max	Ist Min	Ist Max	Att Min	Att Max
Dance	75 %	100 %	10 s	1 s	-3 dBm	+6 dBm
Pop, rock	30 %	100 %	20 s	0,5 s	-3 dBm	+6 dBm
Electronic	50 %	100 %	10 s	1,5 s	-3 dBm	+3 dBm
Jazz	40 %	100 %	5 s	0,5 s	-3 dBm	+6 dBm
Classical	20 %	92 %	30 s	0,5 s	-4 dBm	+10 dBm
Talk show	40 %	85 %	30 s	1 s	-3 dBm	+14 dBm

For this function to perform at best, it is recommended that you perform some tests with your music programmes in order to identify optimal parameter settings:

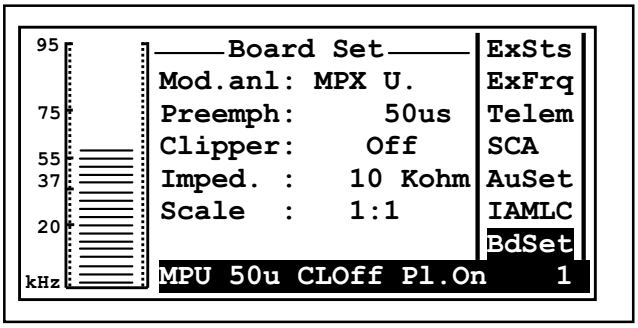
- Use the MODPK menu to determine mean modulation. Adjust audio input level (from the main menu) so as to achieve a mean modulation as close to 100% as possible.
- Set the IAMLC parameters listed in the table; try different settings so as to keep IAMLC operation within reasonable limits. Note that operation stops when modulation rises above the minimum threshold and drops below the minimum threshold.
- Using the clipper circuit (BdSet menu) helps contain peaks exceeding 100 % of modulation, but introduces a certain amount of distortion. Evaluate whether this limiter is necessary based on your music programme requirements.

The figure provides an example of the mean modulation level trend when the IAMLC feature is available.



7.2.2.10 BoardSet

Modulation mode configuration



`Mode` Transmission mode selector: MONO, MPX_U (unbalanced MPX BNC input), MBX_B (balanced MPX XLR input), STEREO. The latter option is only enabled on the version with stereo coder.

`Preemph` Preemphasis setting, 0, 25, 50 or 75 us. Preemphasis affects the right and left inputs in stereo mode and the mono input. MPX inputs are not affected by preemphasis setting.

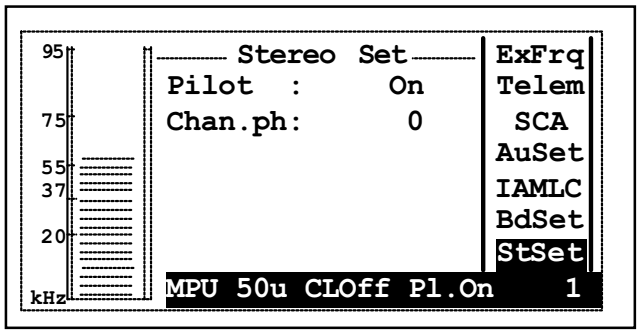
`Clipper` Deviation limiter enable/disable. Limits deviation to 81.5 kHz for input levels 6 dB greater than input reference (main menu)

`Imped` Impedance of balance audio inputs; setting possibilities are 600 or 10k Ohm.

`Scale` Modulation level graphic scale ratio. It can be set to 1:1 (standard scale) or 1:10 (magnified 10 times, convenient when evaluating modulation for low input levels).

7.2.2.11 Stereo Set

Configuration menu for stereo coder card (where relevant option is installed).

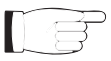


`Pilot` Add/remove pilot tone (convenient for some types of measurements)

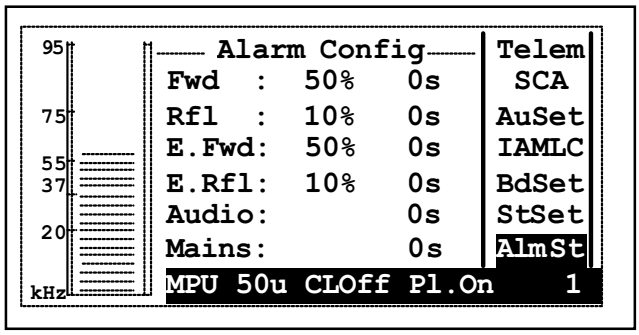
`Chan.ph` Right channel phase, may be 0 or 180 (signal reversal, convenient when measuring "Sub to Main").

7.2.2.12 Alarm Config

Telemetry and remote alarm reporting management menu.



Before accessing edit mode for the different parameters, ensure that the machine has been placed into "LOCAL" mode from the General Set menu, or you will keep getting alarm messages during the whole setting procedure. When finished, place machine back into "REMOTE" mode to activate remote alarm reporting.



`FWD` Setting of the **PTX-LCD** forward power alarm. Alarm is triggered when output power drops below the set percent threshold for the set time (expressed in seconds).

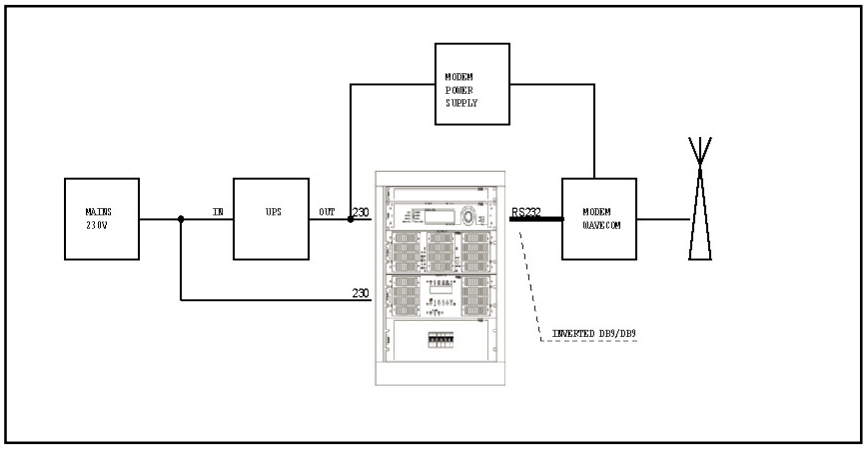
`RFL` Setting of the **PTX-LCD** reflected power alarm. Alarm is triggered when output power rises above the set percent threshold for the set time (expressed in seconds).

`E.FWD` Setting of external exciter forward power alarm. Alarm is triggered when output power drops below the set percent threshold for the set time (expressed in seconds).

E.RFL — Setting of external exciter reflected power alarm. Alarm is triggered when output power rises above the set percent threshold for the set time (expressed in seconds).

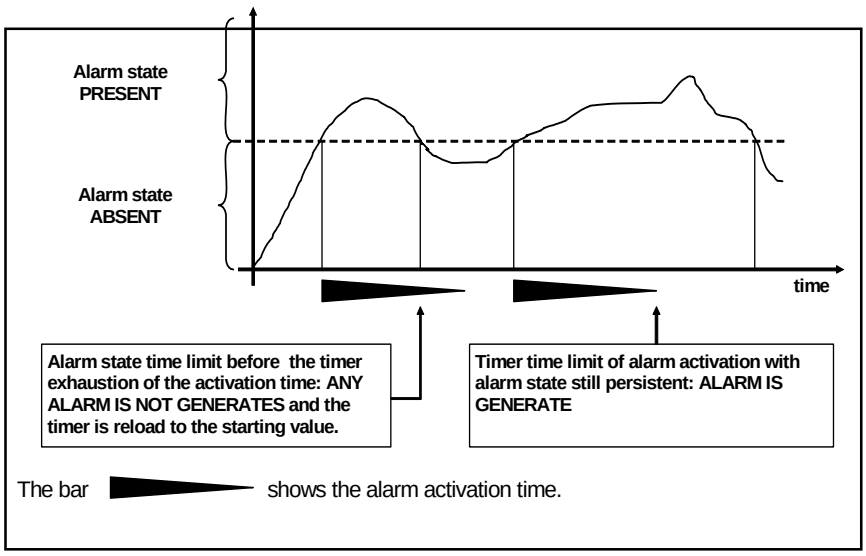
AUDIO — Alarm setting for audio input signal to the **PTX-LCD**. Alarm is triggered for the set time.

MAINS — To handle MAINS alarm, attach jumper no. 10 to JP8 on the **PTX-LCD** panel board and move the jumpers at JP6 on the power supply card from positions 3-5 and 4-6 to 1-3 and 2-4.
Provide an auxiliary power supply source for the **PTX-LCD** through a generating set, a UPS unit or through the 24V power supply terminals (if available on the **PTX-LCD**) for the event of mains outage. Shown below is a hookup diagram for an R.V.R. station, where the **PTX-LCD** is configured to handle MAINS alarm .



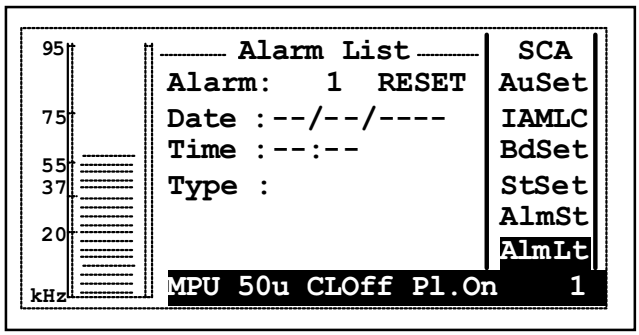
The MAINS alarms is triggered when mains outage duration equals set time.

Shown below is the operating logic of an alarm:


Alarm state
PRESENT
Alarm state
ABSENT
time
Alarm state time limit before the timer exhaustion of the activation time: ANY ALARM IS NOT GENERATES and the timer is reload to the starting value.
Timer time limit of alarm activation with alarm state still persistent: ALARM IS GENERATE
The bar
shows the alarm activation time.

7.2.2.13 Alarm List

Triggered alarms are stored in a non volatile memory and the six events occurred last can be viewed in the "Alarm List" menu.



ALARM — Display of stored alarm number. Select one of the six alarms as follows: select number and choose from the list of alarms 1 ... 6 using the encoder. Again using the encoder, move cursor to "RESET" and confirm reset operation to clear all stored events.

DATE — Display of alarm record date.

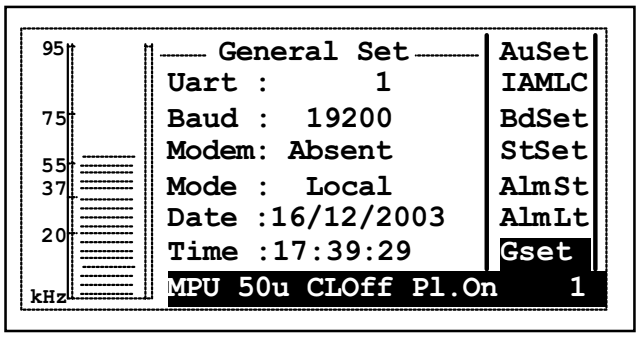
TIME — Display of alarm record time.

TYPE — Display of stored alarm type.

Note: On start-up, the **PTX-LCD** inhibits alarm reporting for a preset time selected at parameter "StartUp Time" (default setting is 60 seconds); after this delay times out, an INFO SMS on the **PTX-LCD** operation state is transmitted. The "StartUp Time" delay also applies to MAINS alarm; on start-up, the **PTX-LCD** will wait for the set time before sending an INFO SMS.

7.2.2.14 General Set

General Setup Menu.



Uart Adr — IIC address of the **PTX-LCD**, selectable from 1 to 200. Unless the exciter is part of a transmission system (for example, N+1), this address must be to 1.

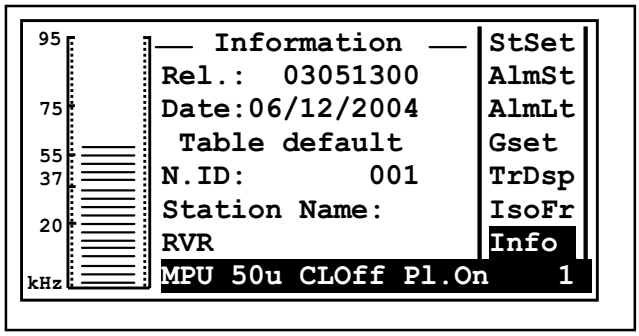
Baud Rate — Baud rate setting for the **PTX-LCD** serial port data transfer.

MODEM Configures machine to use a modem (Present), for direct cable connection, (Absent), GSM and Pager.

MODE Local: The machine will not accept changes to parameters from external devices. Remote: Enables remote setting of machine parameters.

7.2.2.15 Information

This menu provides general information on the exciter.



Rel Exciter software release information.

Date Software Release date.

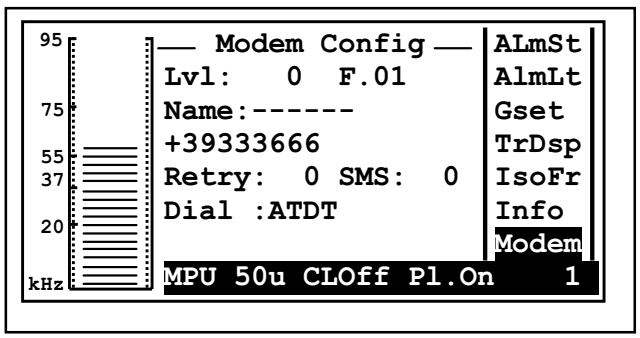
N.ID Identifier used when system is made up of several machines; it may be modified using the TELECON software (please read relevant manual for more details).

Station Name

Name of the station the machine is part of; station name may be modified using the TELECON software (please read relevant manual for more details).

7.2.2.16 Modem

This menu lets you view modem configuration state.



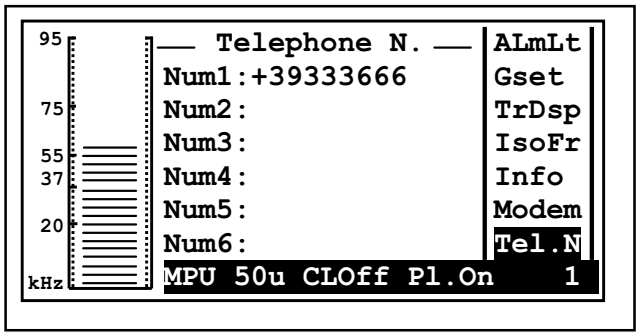
lvl Signal level indication. Modem state is reported at the side: ST.BY

(Stand by), CKSMS (Check SMS), TXSMS (Transmission SMS).

Name	Name of SIM card service provider. The value right below the name is the set service centre number.
Retry	SMS transmission attempts indication.
SMS	Maximum number of SMS's the SIM card can store.
Dial	Type of initialisation string used by Modem.

7.2.2.18 Telephone

This menu displays the first six of ten preset telephone numbers to which an SMS message is to be sent in the event of an alarm.



8. System Status Enquiries

8.1 Local enquires

Locally, **PTX-LCD** provides status indications through the front panel lights, whereas more detailed information is available in the setup and configuration menu.

8.2 Remote enquiries using remote control software (Opt.)

Using a PC with the "TELECON" telemetry and remote control software installed, the user can get an accurate picture of all system operating parameters and all device settings (including connected equipments).

8.3 Remote enquires using GSM modem+SMS

Thanks to this system, equipments can be enqueried using a common GSM phone; possible equipment responses are listed in the tables included in the following paragraphs.

Before enquiring the system using SMS messages, establish a connection using the "TELECON" programme and set the provider service centre number and the telephone numbers authorized to send these commands to the equipments.

8.3.1 List of supported commands that can be sent via SMS

- These commands cam be sent to the **PTX-LCD**:

STANDARD

INFO	Information sent on the system operating state
TXON	“OnAir” PTX-LCD Switch On
TXOFF	“OnAir” PTX-LCD Switch Off
ALARM	Information sent on the alarms present into PTX-LCD list.
RESET	Reset of all stored alarms.
RESMOD	Reset of GSM modem and all SMS present into SIM.

TRDSP AND ISOFREQUENCY OPT.

DELAY xxxxx	TRDSP card delay setting. xxxxx is equivalent to the forward regulation of the delay expressed in µs, between 0 and 10 ms.
STEP +/-xx	Fine setting of the TRDSP card delay, in adding (+) or in reduction (-). xx are the regulation steps, between 0 and 20, equivalent to 0.05 µs each.
PH +/-	Phase setting: (+) normalized, (-) inverted.

- Example of the **PTX-LCD** response to received SMS enquires:

STANDARD

INFO	001-Test station=Pwr On,FWD: 12.5W,RFL: 0.1W,ExFWD: 50%, ExRFL: 1%,Frq: 88.520 MHz,Audio Present,GSM lvl=-77,MAINS Present
TXON	001-Test Station=ON Command
TXOFF	001-Test Station=OFF Command
ALARM	001-Test Station=Tot 1/6 -Alarm 02u= 11/02/2004,11:43,Low FWD Power
RESET	Alarm Reset
RESMOD	Reset Modem

TRDSP AND ISOFREQUENCY OPT.

DELAY 624	001-Test Station=Total Delay Set: 624,00 us
STEP +10	001-Test Station=Total Delay Set: 624,50 us
PH +/-	(+) Normalized phase; (-) Inverted phase

Note: The DELAY and STEP commands are only available if the optional TRDSP card is installed

Note: For **PTX-LCD** to actually process the reply or requested command, the GSM number used to send the request must be stored in the list of numbers set in **PTX-LCD**. This does not apply to INFO SMS messages; **PTX-LCD** will answer regardless of whether the originating number is registered or not.

9. Remote Alarm Reporting and Control (Opt.)

The Remote Alarm Reporting and Control service is activated when the **PTX-LCD** is supplied in one of the following configurations:

- Radio Modem Box (telemetry interface);
- External GSM modem;
- Internal GSM modem (/GSM option).

9.1 Preparation

Ensure that the SIM card to be inserted into the external modem, the internal modem or into the modem housed in the Radio Modem Box is registered for Data & Fax Service (see facsimile contract in Fig. 5.1).

SIM card configuration for DATA/FAX reception must meet the following specifications:
- Asynchronous;
- Transparent;
- 300-9600 Baud.

Maximum connection speed is 9600 baud for transmission over GSM phone line.

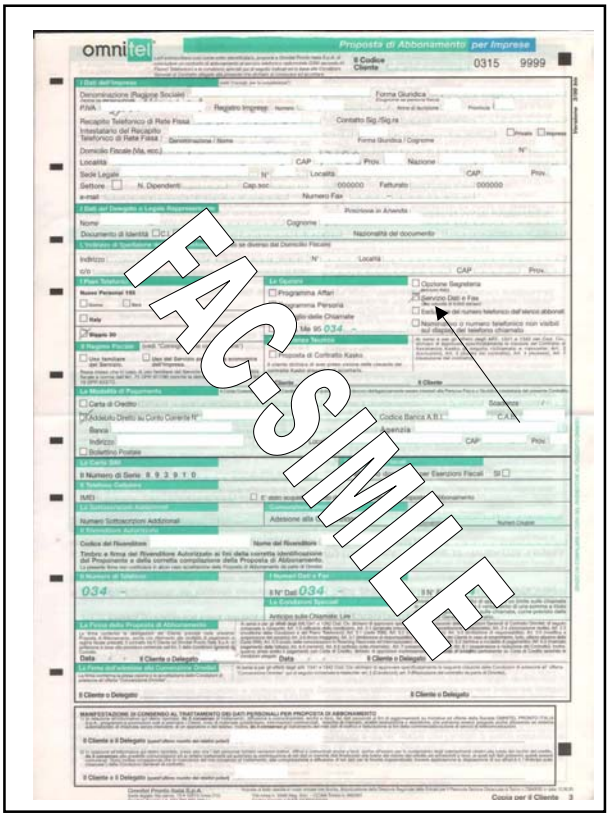


Figure 5.1

9.1.1 Radio Modem Box Configuration

Follow the instructions provided below closely to ensure correct configuration of **PTX-LCD** connection:

1) Open the Radio Modem Box.
2) Insert the SIM card into the GSM modem (see Fig. 5.2).
3) Set dipswitches as required (see table 5.1).

SW	PJ2000MC PJ1000M (dig. meter) PJ500M-C HC (dig. meter) PJ1000C	PJ1000M (ana. Meter) HC (ana. Meter)	PJ300M PJ501M
1	OFF	ON	ON
2	OFF	ON	ON
3	ON	OFF	OFF
4	ON	OFF	OFF
5	ON	ON	OFF
6	OFF	OFF	ON
7	ON	ON	OFF
8	OFF	OFF	ON

Table 5.1

4) Close the Radio Modem Box.
5) Connect the 220V power supplies.
6) Connect the RS232 (DB9) cable across the **PTX-LCD** and Radio Modem Box.
7) Connect the REMOTE (DB15) cable across the **PTX-LCD** and Radio Modem Box.
8) Connect the Telemetry (DB25) cable across Radio Modem Box and amplifier (if fitted).
9) Connect the red/black cable across the **PTX-LCD** and Radio Modem Box jacks; take care to avoid possible short circuits.
10) Power on the devices.
11) Connect PC and Radio Modem Box using the front panel RS232 DB9 connector.
12) Programme the internal EEPROM of **PTX-LCD**.
13) Before setting the various remote alarm reporting parameters on the **PTX-LCD**, ensure it has been placed into "LOCAL" mode, or you will be getting alarm indications during the whole setting procedure (see **PTX-LCD** Manual, Volume 1, Section "Alarm Config").
    If the Radio Modem Box is connected to a **PTX-LCD**, alarm time factory settings are as follows:
    MAINS: 10 sec
    FWD: 15 sec
    RFL: 15 sec
    If the Radio Modem Box is connected to a **PTX-LCD** with external amplifier, alarm time factory settings are as follows:
    MAINS: 10 sec
    Ext. FWD: 15 sec
    Ext. RFL: 15 sec

Mains alarm time must always be lower than FWD and RFL time.
When finished, place **PTX-LCD** back into "REMOTE" mode.

14) Disconnect the PC connection cable and connect the supplied DB9/DB9 cable.
15) Connect the GSM modem antenna to connector "N" of the Radio Modem Box. Use a broadband Yagi log-periodic directional antenna (700-900 MHz).
16) Select modem as "GSM" in **PTX-LCD** settings and set Baud Rate to 9600.

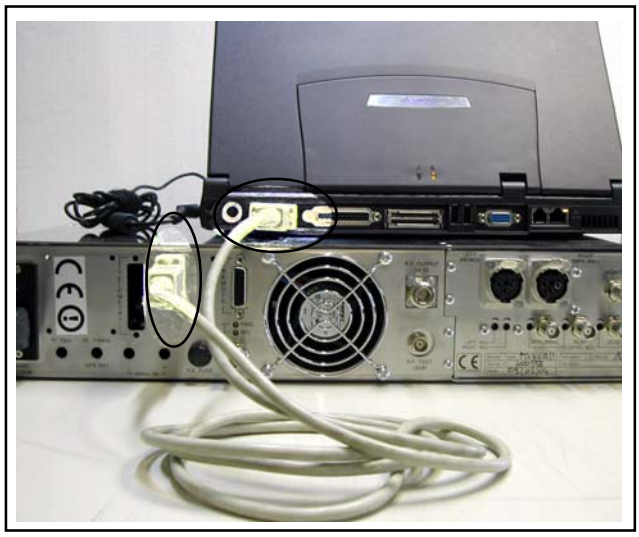
Follow the instructions provided below closely to ensure correct configuration of TLC/SCM connection:

1) Open the Radio Modem Box.
2) Insert the SIM card into the GSM modem (see Fig. 5.2).
3) Set dipswitches as required (see tab. 5.1).
4) Close the Radio Modem Box.
5) Connect the 220V power supplies.
6) Connect the RS232 (DB9) cable across the TLC/SCM unit and the Radio Modem Box.
7) Connect the red/black cable across the TLC/SCM unit and Radio Modem Box jacks; take care to avoid possible short circuits.
8) Switch on the equipments.
9) Connect PC and Radio Modem Box using the front panel RS232 DB9 connector.
10) Programme the internal EEPROM (refer to TLC/SCM manual).
11) Disconnect the PC connection cable and connect the supplied DB9/DB9 cable.
12) Connect the GSM modem antenna to connector "N" of the Radio Modem Box. Use a broadband Yagi log-periodic directional antenna (700-900 MHz).
13) Select modem as "GSM" in TLC/SCM settings.

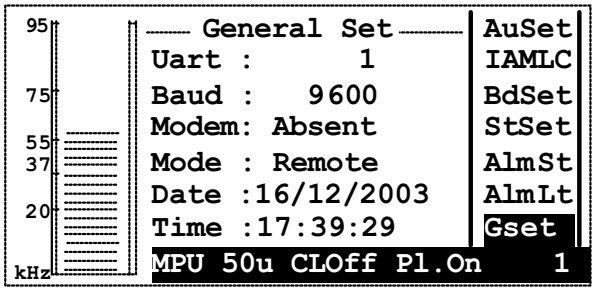
Figure 5.2

9.2 Remote Alarm Reporting COnfiguration

Firstly, you will have to programme certain the **PTX-LCD** parameters using the "TELECON" software. To this end, connect the PC serial port COM to the RS232 connector on the **PTX-LCD** rear panel using a standard Male DB9 - Female DB9 serial cable.



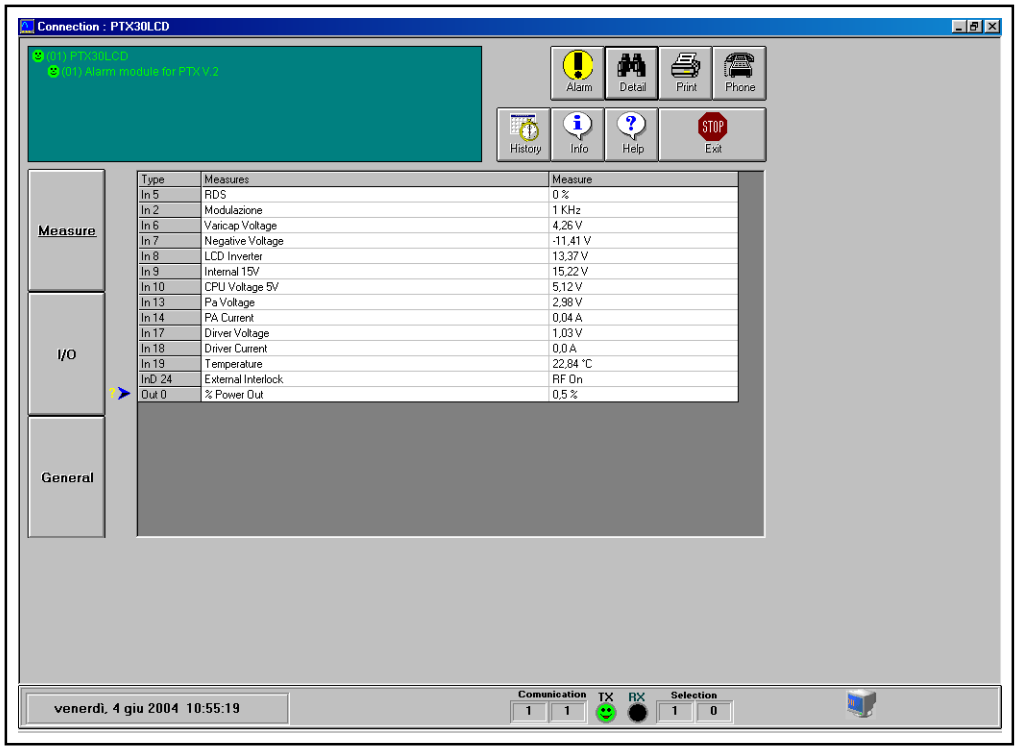
Set the parameters in the "General Set" menu of the **PTX-LCD** as specified below:



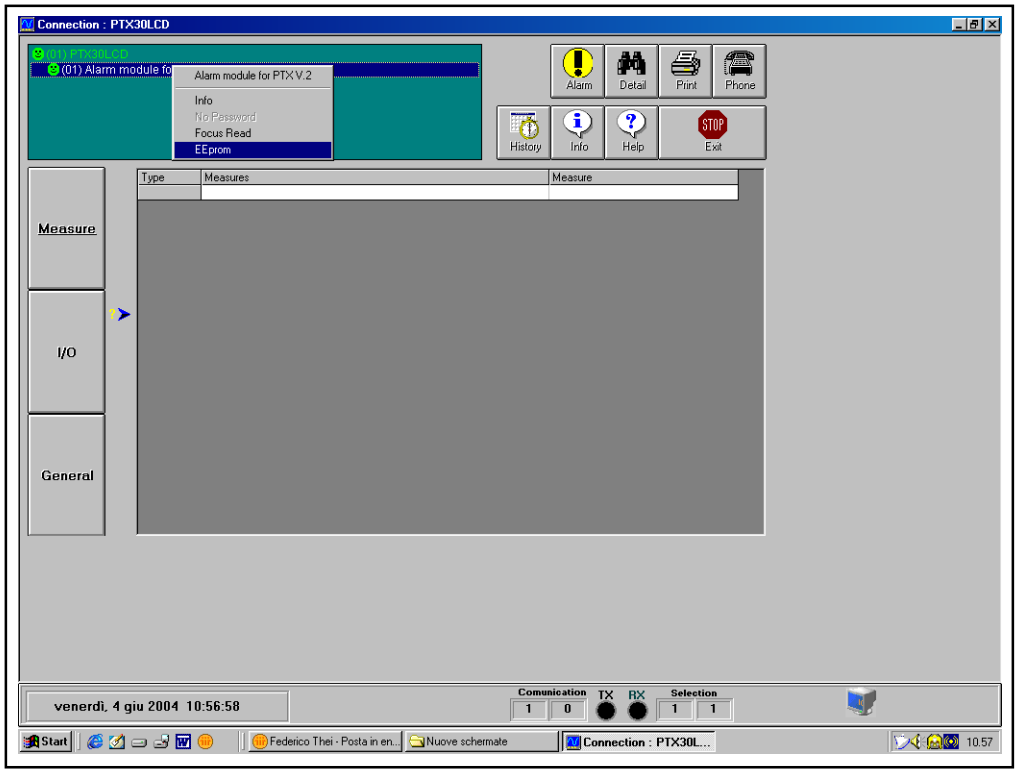
When using the "TELECON" software for the first time, select the station and then enter:

- COM port used,
- Baud rate (9600),
- type of connection (direct, via cable).

When you have entered the correct data, click the "Start" button to confirm and the "TELECON" main screen appears, as shown in the figure:



Double click the green label in the top left corner of the TELECON screen and select "Eeprom" (as shown in the figure below).



In the open menu, press this key to view station parameters.

Select the "General" data category and set the 5 parameters:

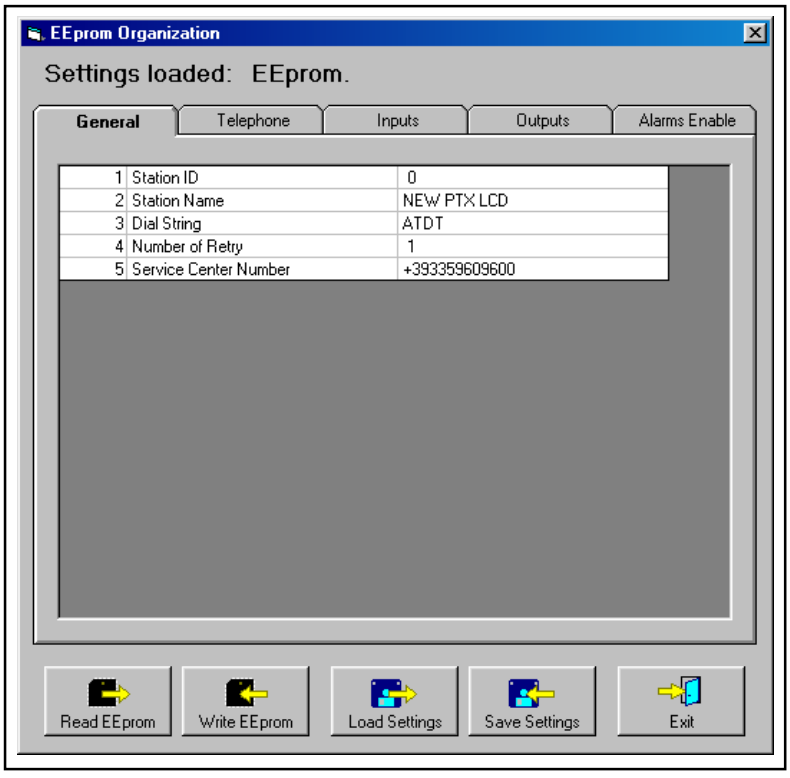
- **STATION ID**: station identifier;
- **STATION NAME**: (max 18 characters);
- **DIAL STRING**: required setting for a GSM modem is ATDT;
- **NUMBER OF RETRY**: number of alarm transmission repetitions;
- **SERVICE CENTER NUMBER**: number of GSM provider service centre for SMS transmission and reception; place country code before number.

  Example with Italian service providers:

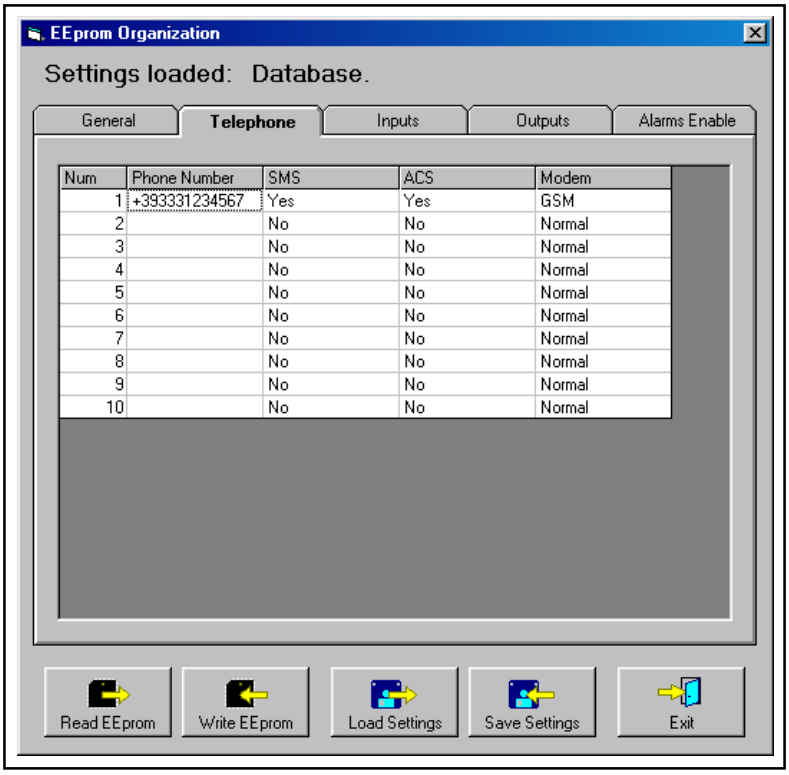
  TIM: +393359609600

  VODAFONE: +393492000200

  WIND: +393205858500



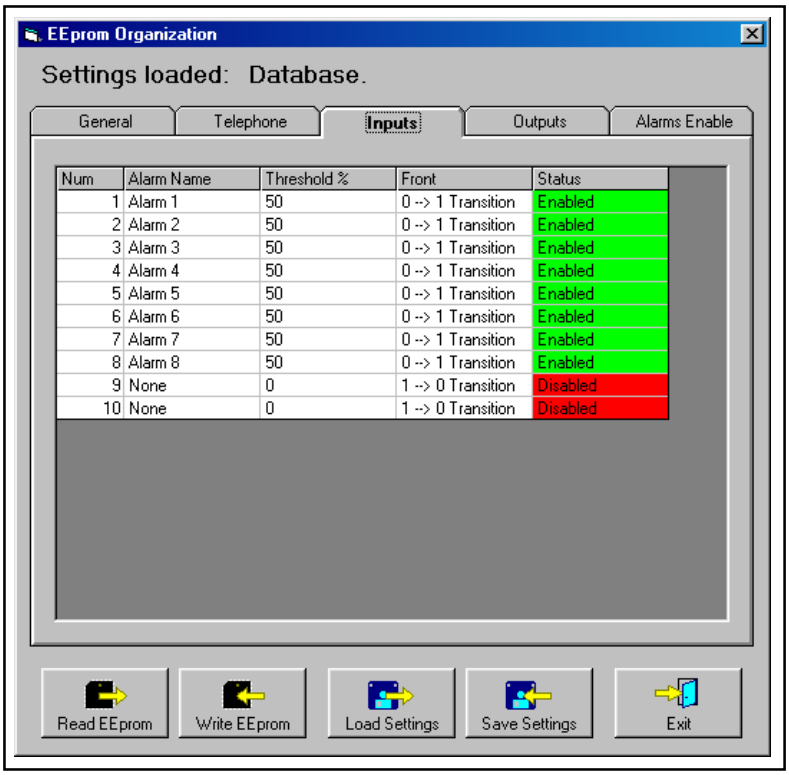
Now select the "Telephone" data category and set the following:



- **PHONE NUMBER**: GSM phone numbers recognised by the station to which you want the alarms sent;
- **SMS**: select "YES" to enable transmission of SMS commands to system;
- **ACS**: select "YES" to enable SMS reception;
- **MODEM**: select "GSM".

Note: For correct transmission, place country code (+XX) before set numbers.

Eight customised programmable alarms can be set if the optional telemetry card is installed.


EEprom Organization
Settings loaded: Database.
General
Telephone
Inputs
Outputs
Alarms Enable
Num | Alarm Name | Threshold % | Front | Status
1 | Alarm 1 | 50 | 0 --> 1 Transition | Enabled
2 | Alarm 2 | 50 | 0 --> 1 Transition | Enabled
3 | Alarm 3 | 50 | 0 --> 1 Transition | Enabled
4 | Alarm 4 | 50 | 0 --> 1 Transition | Enabled
5 | Alarm 5 | 50 | 0 --> 1 Transition | Enabled
6 | Alarm 6 | 50 | 0 --> 1 Transition | Enabled
7 | Alarm 7 | 50 | 0 --> 1 Transition | Enabled
8 | Alarm 8 | 50 | 0 --> 1 Transition | Enabled
9 | None | 0 | 1 --> 0 Transition | Disabled
10 | None | 0 | 1 --> 0 Transition | Disabled
Read EEprom
Write EEprom
Load Settings
Save Settings
Exit

- **ALARM NAME**: Name of alarm sent with SMS (max 20 characters);
- **THRESHOLD**: Alarm activation threshold in percent;
- **FRONT**: **0-->1** Alarm is activated if signal exceeds set threshold
  1-->0 Alarm is activated if signal drops below set threshold;
- **STATUS**: **Enable** Enable Alarm reporting enable
  DIsable Disable Alarm reporting disable

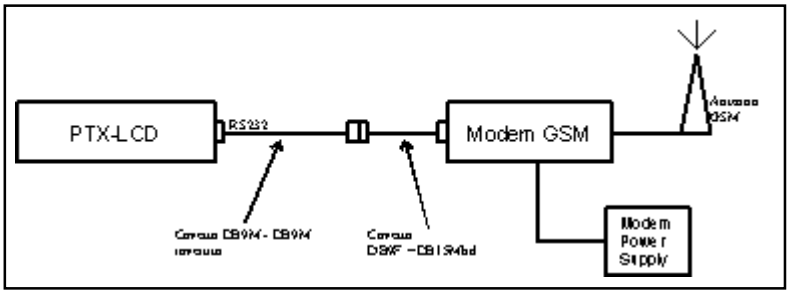
When all parameters are set, press this key and the **PTX-LCD** will store the information.

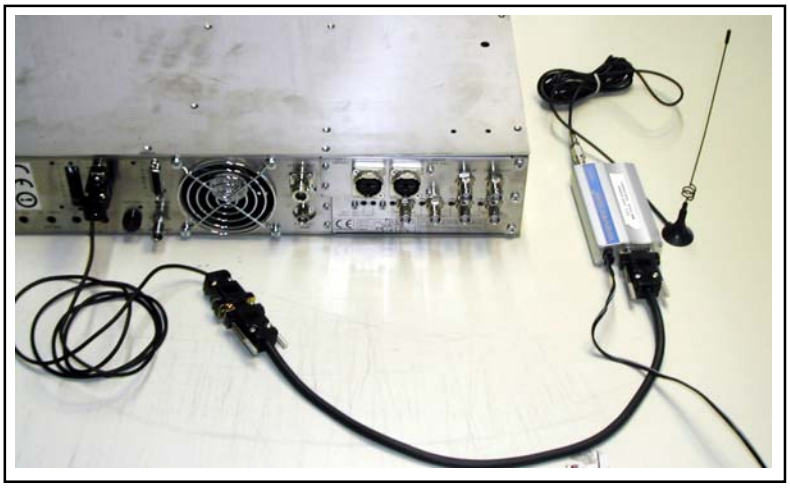
When finished, click "Exit" to exit the remote station programming window.

Back into "TELECON" standard interface, click the "General" measurement selection button to set thresholds and operation times for the various alarms according to the principles outlined in Section "Alarm Management".

Note: When setting alarm thresholds, allow a margin of some percent points with respect to normal operation parameters.

Note: When the configurations are completed, do not forget to connect the GSM modem to the **PTX-LCD** using the supplied cables; the following block diagram and picture are for your reference:

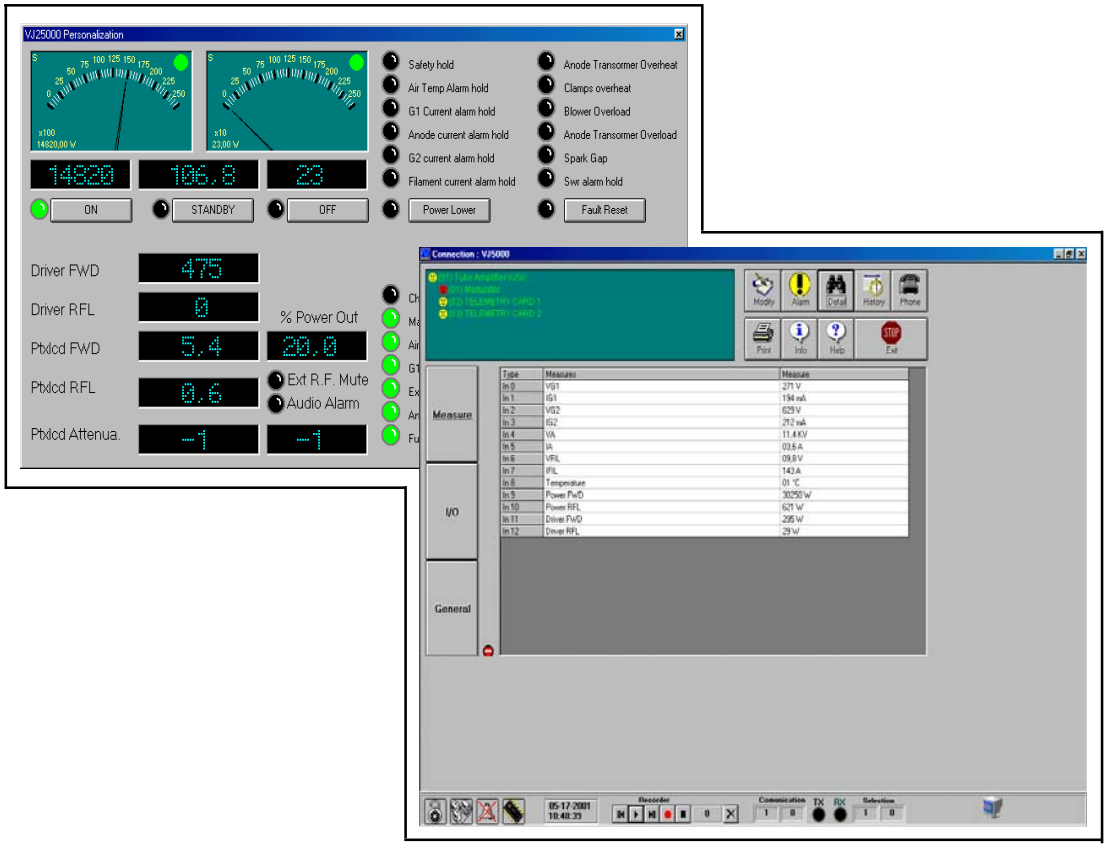




9.3 Remote Control

All **PTX-LCD** parameters can be monitored on a PC with a suitable modem connection.

The "TELECON" software establishes connection with the station through a phone line or GSM modem and enables the following remote operations: alarm reset, transmitter switch on/switch off, output power reduction, dummy load testing, etc., data evaluation to locate possible faults, identification of parts required for repair.



9.4 Internal Modem (Option /GSM)

With this option, all operations listed above can be performed via the modem built into the exciter.

When the configurations are completed, do not forget to connect the integrated GSM modem to PTX-LCD using the supplied cable as shown in the picture:

Note: The RS232 and MODEM connectors are connected to each another by factory. However, they may also be used independently (for example, RS232 connector for factory parameter programming and MODEM connector for GSM modem connection to PC).

10. Technical Specifications

10.1 Mechanical Specifications

Panel size		483 mm (19") x 88 mm (3 1/2") (2 HE)
Depth		344 mm (26 1/2")
Weight	PTX30	13 Kg
	PTX60	15.5 Kg
	PTX100	15.5 Kg
Operating temperature		-10 °C ÷50 °C

10.2 Electric Specifications

General

RF output power	PTX30LCD:	0-30 W, adjustment with continuity
	PTX60LCD:	0-60 W, adjustment with continuity
	PTX100LCD:	0-100 W, adjustment with continuity
RF output connector		type "N"
RF output impedance		50 Ohm
Frequency band		87.5 MHz ÷ 108 MHz
Frequency programming		direct via software
Frequency stability		±1ppm from -10 °C to 50 °C
Type of modulation		direct carrier modulation
Spurious and harmonic suppression		meets or exceeds FCC and CCIR standards (typically, 85 dB)
Modulation capacity		meets or exceeds FCC and CCIR standards (typically, 240kHz for MPX or Mono, 210 KHz for Stereo)
Residual asynchronous AM modulation		-70 dB or less with respect to 100% AM, without deemphasis
Residual synchronous AM modulation		-60 dB or less with respect to 100% AM, 75KHz FM modulation at 400Hz, without deemphasis
Transient intermodulation distortion		< 0.1% (typically, 0.05%) measured with square waveform at 3.18 kHz and sinusoidal waveform at 15 kHz with 75 kHz FM
Power supply		115÷125 V, 50÷60 Hz 230÷250 V, 50÷60 Hz
Absorption	PTX30LCD	approx. 120 VA
	PTX60LCD	approx. 200 VA
	PTX100LCD	approx. 300 VA

Inputs

Left/Mono-Right/MPX inputs	Female XLR type, balanced or unbalanced
MPX input	BNC type, unbalanced
Input impedance	10 KOhm or 600 Ohm, software selectable
Input level	-13 dBm ÷ +14 dBm adjustable in 1 dB steps via software, fine tuning with continuity by trimmer

Preemphasis	selectable:	0 25 us 50 us (CCIR) 75 us (FCC)
SCA/RDS inputs		3 unbalanced BNC connectors
SCA input impedance		10 KOhm
SCA input level		-20 dBm ÷ +10 dBm, adjustable by trimmer
SCA amplitude/frequency response		± 0.2 dB, from 40 KHz to 100 KHz
67KHz subcarrier crosstalk on main or stereo channels		65 dB
92KHz subcarrier crosstalk on main or stereo channels		70 dB

Outputs

MPX Monitor:	0 dBm for 75KHz FM minimum load 600 Ohm
19 KHz pilot tone	1 Vpp minimum load 4.7 KOhm
RF Test	-30 dB referred to RF output impedance 50Ohm

MONO operation

FM S/N	> 82dB (typically 90 dB) referred to 75KHz measured in 20 Hz band ÷ 20 KHz with 50 us deemphasis, RMS detector
Amplitude/frequency response	± 0.5 dB, 20Hz ÷ 15KHz
Total Harmonic Distortion (THD)	< 0.02%
Intermodulation distortion	< 0.02% measured with 1 kHz and 1.3 KHz tones, 1:1, 75 kHz FM modulation

MPX operation

Composite FM S/N	> 82dB (typically 90 dB) referred to 75KHz measured in 20 Hz band ÷ 100 KHz with 50 us deemphasis, RMS detector
MPX amplitude/frequency response	± 0.05 dB, 20 Hz ÷ 53 KHz ± 0.2 dB, 53 KHz ÷ 100 KHz
MPX total harmonic distortion	< 0.02%
Intermodulation distortion	< 0.02% measured with 1 KHz and 1.3 KHz tones, 1:1, 75 kHz FM modulation
Stereo separation	> 50 dB (typically 60dB)

Stereo Operation

Stereo FM S/N	> 82dB (typically 90 dB) referred to 75KHz measured in 20 Hz band ÷ 100 KHz with 50 us deemphasis, RMS detector
Audio amplitude/frequency response	± 0.5 dB, 20Hz ÷15KHz
Total harmonic distortion	< 0.03%
Intermodulation distortion	< 0.03% measured with 1 kHz and 1.3 KHz tones, 1:1, 75 kHz FM modulation
Stereo separation	> 50 dB (typically 60dB)

Remote connections

Remote connector	Female DB15 type; provides: FWD and RFL inputs for external AGC 6 analogue or digital inputs 2 relay digital outputs
Interlock connector	BNC, for power disable
I²C interface	
Serial interface	Female DB9 RS232, DTE or DCE selectable RS485 (Option) DTE or DCE selectable
Telemetry card Option	Female DB25 type 8 analogue/digital inputs 2 digital outputs 1 I2C serial interface

Options

/03	24V External Battery
/08	Telemetry interface
/AUDIOINP-DIG	Digital audio input interface
/TRDSP	Digital and analogue audio input interface, DSP technology, integrated Digital Stereo Coder, integrated RDS Coder
/GSM	Integrated GSM Modem

AUDIOINP-DIG

D/A converter	24 bit
Sampling frequency	from 32 to 96 KHz
Data format	S/PDIF, AES/EBU, IEC958 and EIAJ CP340/1201
Digital inputs	1 unbalanced input for coaxial cable with PIN/RCA connector (S/PDIF) 1 fiber optics TOSLINK 1 XLR balanced female connector (AES/EBU)
Emergency switch	3.5mm JACK; connected to ground, forces audio input selection

TRDSP

ANALOGUE AUDIO INPUT	
Conversion	24 bit
Connector	XLR, electronically balanced
Impedance	600/10K - adjustable via software
Input level	Adjustable via software
Maximum input level	6/18/30 dBu

DIGITAL AUDIO INPUT	
Connector	Balanced XLR + optical TOS-LINK
Data format	AES/EBU -S/PDIF - EIAJ-340
Sampling frequencies	from 32 to 96 KHz

DIGITAL AUDIO OUTPUT	
Connector	PIN – RCA Unbalanced
Data format	S/PDIF
Sampling frequencies	96 kHz

MPX OUTPUT	
D/A conversion	24 bit
Pilot Tone	19 KHz ±0.5 Hz
Pilot level	Selectable
Pilot phase	Selectable
Subcarrier attenuation 38 KHz	min. -90 dB
MPX output level	Selectable
Stereo separation	65 dB, 30 Hz - 15 kHz
MPX output noise	-90 dBu
Preemphasis	50/75 microsec.
Preemphasis error	±0.01 dB, 30 Hz - 15 kHz
15 kHz low-pass filter ripple	±0.01 dB, 30 Hz - 15 kHz
Low-pass filter 19 KHz attenuation	-90 dB
Clipper	Right and left channel + MPX
AGC	Left and right channel

RDS	
Cenelec 50067	Specification (PI: Program Identification, PS: Program Service, PTY: Program Type, TP: Traffic Program Identification, TA: Traffic Announcement, AF: Alternative Frequencies, M/S: Music/Speech, PIN: Program Item Number, RT: Radio Text, EON: Enhanced Other Networks, TDC: Transparent Data Channel, IH: In-house Application)
Subcarrier frequencies	57 kHz ±1.5 Hz
Synchronisation	Internal or external

ELABORATION	
A/D conversion	24 bit
D/A conversion	24 bit
DSP elaboration	32 bit

11. Factory Settings

Each time a change is made to a **PTX-LCD** parameter, the new setting is added to machine configuration information, which is stored in a non-volatile memory area. On switch on, the exciter will retain the same configuration it had been using before the last switch off.

At the factory, the exciter may be set to meet application-specific requirements (for example, when the customer specifies operating frequency and mode of operation of the system the exciter is to be incorporated into on order), or to a preset configuration.

The **PTX-LCD** preset configuration is determined by the position of a set of jumpers located inside the machine. When the exciter is switched on, the name of the selected preset configuration appears on the display (see 7.1).

Possible configurations are as follows:

CCIR

Parameter	Menu	Value	
Power Output	Preset	On	
Minimum frequency	/	87.5 MHz	
Maximum frequency	/	108.0 MHz	
Frequency step	/	10 kHz	
Preset frequencies	Admin-ExFrq	87.5, 90.0, 92.0, 94.0, 96.0, 98.0, 100.0, 102.0, 104.0, 106.0 MHz	
Power	Preset	0 %	
Input level Mono/L	Admin->AuSet->Mono/L X dBm	0 dBm	
Input level MPX/R	Admin->AuSet->MPX/R X dBm	0 dBm	
Input state Mono/L	Admin->AuSet->Mono/L X dBm	On	
Input state MPX/R	Admin->AuSet->MPX/R	On	
Preemphasis	Admin->BdSet->Preemph	50 µs	
Clipper	Admin->BdSet->Clipper	Off	
Mode of operation	Admin->BdSet->Mode	Stereo	(if stereo coder is present)
		MPX	(if stereo coder is not present)
Pilot tone	Admin->StSet->Pilot	On	(if stereo coder is present)
Phase difference btw Channels		Admin->StSet->Chan0	(if stereo coder is present)

FCC

Same as CCIR, except:

Parameter	Menu	Value	
Preemphasis	Admin->BdSet->Preenph		
		75 µs	
Mode of operation	Admin->BdSet->Mode		
		Stereo	(if stereo coder is present)
		Mono	(if stereo coder is not present)

OIRT

Same as CCIR, except:

Parameter	Menu	Value	
Minimum frequency	/	66.0 MHz	
Maximum frequency	/	74.0 MHz	
Preset frequencies	Admin-ExFrq	66.0, 67.00, 68.00, 68.00, 69.00, 70.00, 71.00, 72.00, 73.00, 74.00 MHz	
Mode of operation	Admin->BdSet->Mode		
		Stereo	(if stereo coder is present)
		Mono	(if stereo coder is not present)

JAPAN

Same as CCIR, except:

Parameter	Menu	Value	
Minimum frequency	/	76.0 MHz	
Maximum frequency	/	90.0 MHz	
Preset frequencies	Admin-ExFrq	76.0, 78.0, 80.0, 82.0, 83.0, 84.0, 85.0, 86.0, 88.0, 90.0 MHz	
Mode of operation	Admin->BdSet->Mode		
		Stereo	(if stereo coder is present)
		Mono	(if stereo coder is not present)

ITALY

Same as CCIR, except:

Parameter	Menu	Value	
Minimum frequency	/	87.6 MHz	
Maximum frequency	/	107.9 MHz	
Frequency step	/	100 kHz	
Preset frequencies	Admin-ExFrq	87.6, 90.0, 92.0, 94.0, 96.0, 98.0, 100.0, 102.0, 104.0, 106.0 MHz	
Clipper	Admin->BdSet->Preenph		
		On	
Mode of Operation	Admin->BdSet->Mode		
		Stereo	(if stereo coder is present)
		Mono	(if stero coder is not present)

C.S.I

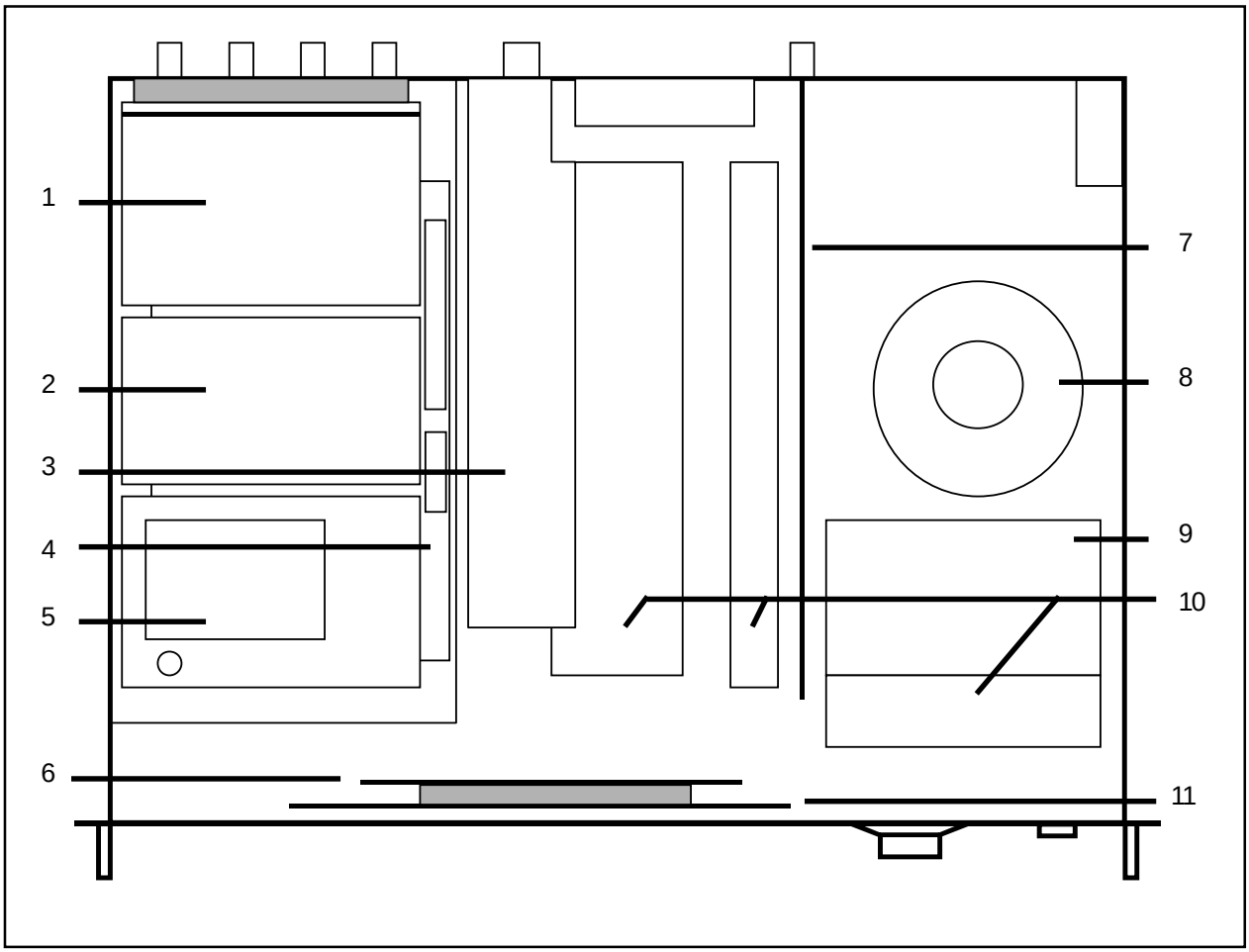
Same as CCIR, except:

Parameter	Menu	Value
Minimum frequency	/	100.0 MHz
Maximum frequency	/	108.0 MHz
Preset frequencies	Admin-ExFrq	100.0, 100.5, 100.1, 101.5, 102.0, 103.0, 104.0, 105.0, 106.0, 108.0 MHz

12. Module Identification and Access

12.1 Module identification

The figure shows a top view of machine inner components. Component descriptions are listed below.



[1] Audio Input card
[2] Stereo Coder or mono card
[3] RF power amplifier
[4] Audio mainboard
[5] PLL & VCO card
[6] CPU Section (CPU Interface + 16Bit CPU card)
[7] Power supply
[8] Transformer
[9] Switching power supply
[10] Cooling fins
[11] Panel card - display

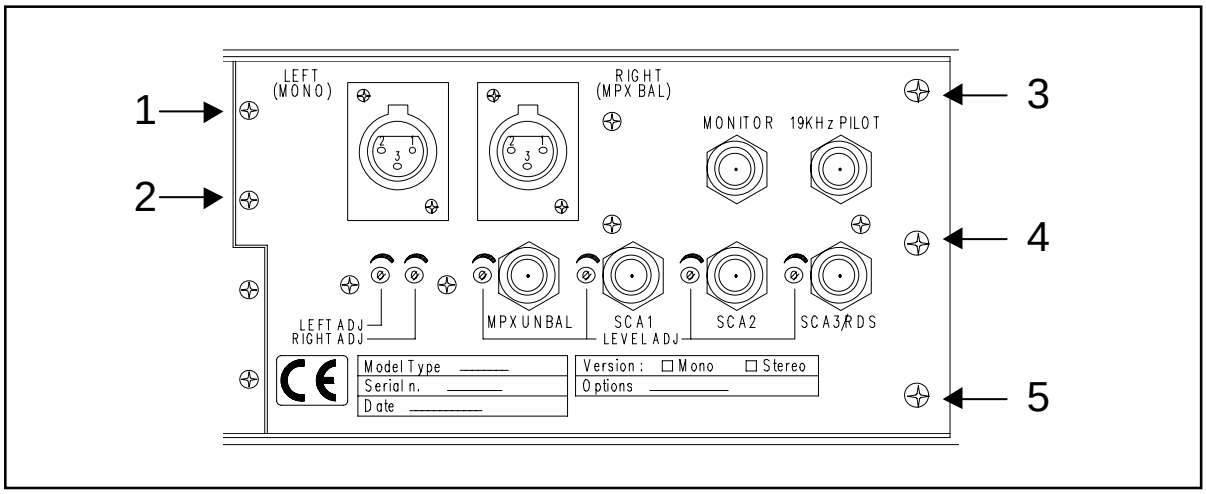
12.2 How to access modules

WARNING: Dangerous voltages or currents inside! Be careful when opening the device. Always disconnect power supply before removing the covers or any device component.

Remove all screws on the top cover of the machine. Remove the cover and refer to the block diagram to identify and locate all exciter components.

To remove the (stereo or mono) coder and PLL cards, simply undo the hexagon nuts that secure the cards over the stud bolts. Both cards have strip connectors at the bottom and these connectors are coupled to the audio mainboard.

To remove the audio input card (which is secured to the audio connector card and to the right side of the exciter rear panel), undo the four nuts that retain the card to the audio mainboard stud bolts and then remove the five screws on the rear panel and the three bottom screws that retain the connector support.



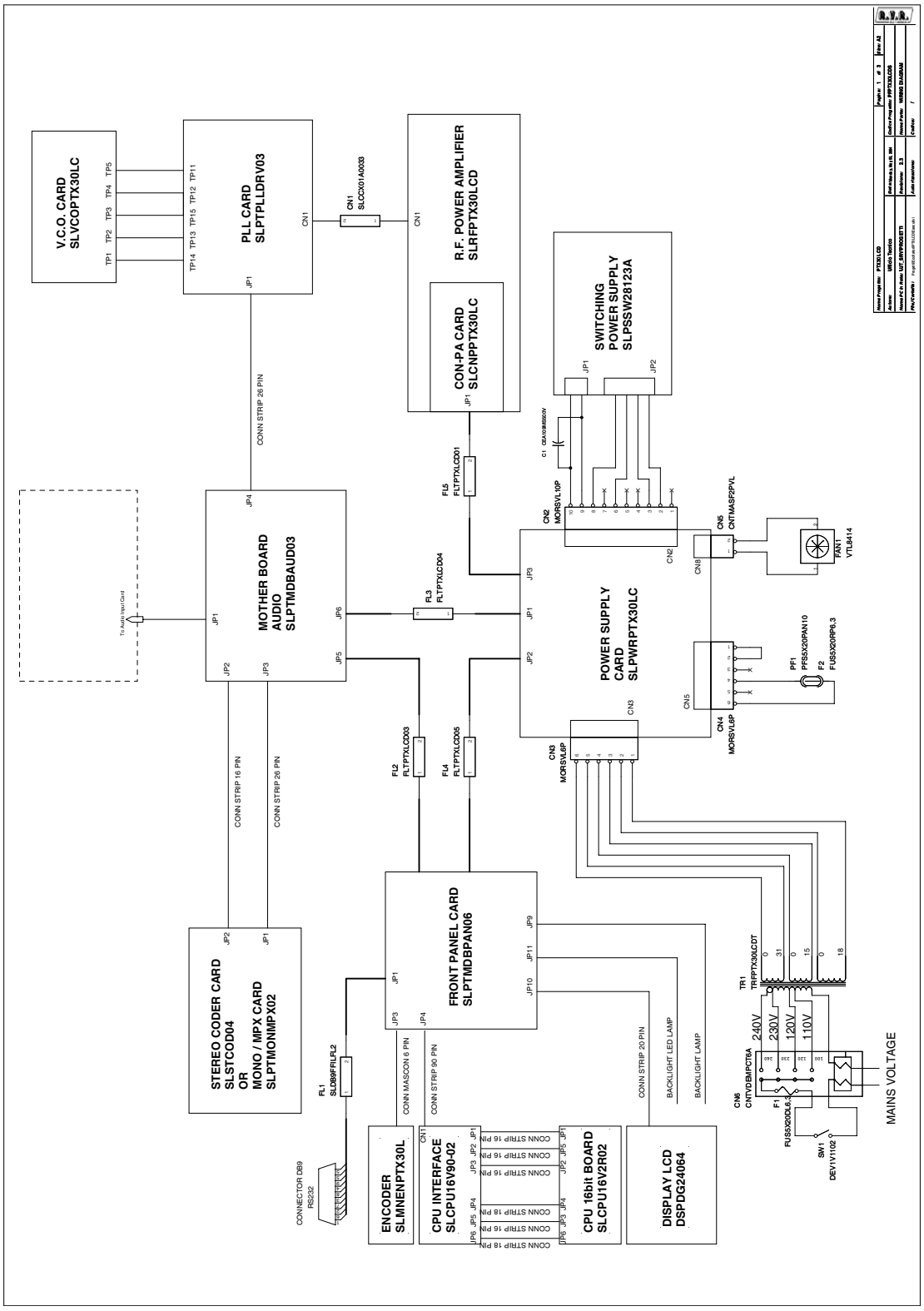
The RF power amplifier is secured to its cooling fin and is held in position by three screws located on exciter bottom. The screws hold the fin in place; remove these screws to release the amplifier.

Power supply and switching power supply use the same fastening system and can be released by removing the screws that secure the fins to machine bottom. Note, however, that the interlock connector soldered to the power supply is retained to the rear panel by a nut, and you will need to undo this nut before you can remove the power supply.

The panel card and the CPU card are held in place by nuts screwed onto the stud bolts. Detach the front panel from the box before removing these cards.

13. Operating principles

The figure below provides an overview of the **PTX-LCD** modules and connections.

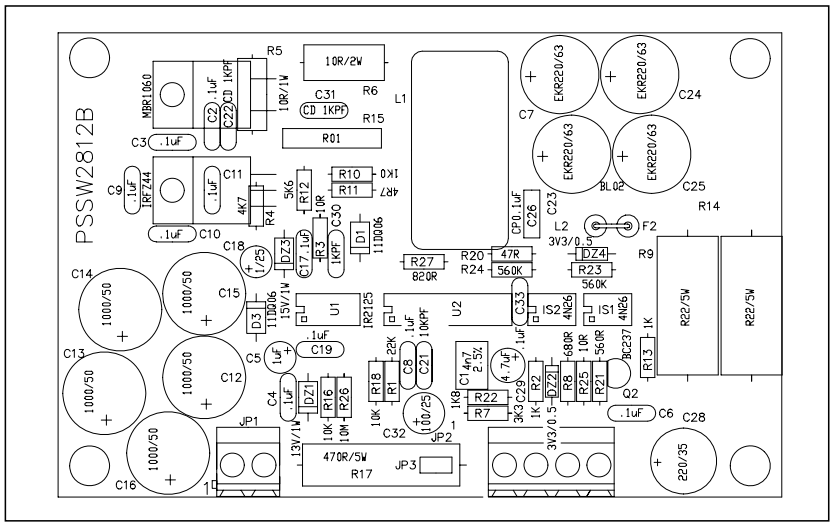


Following is a brief description of the different module functions.

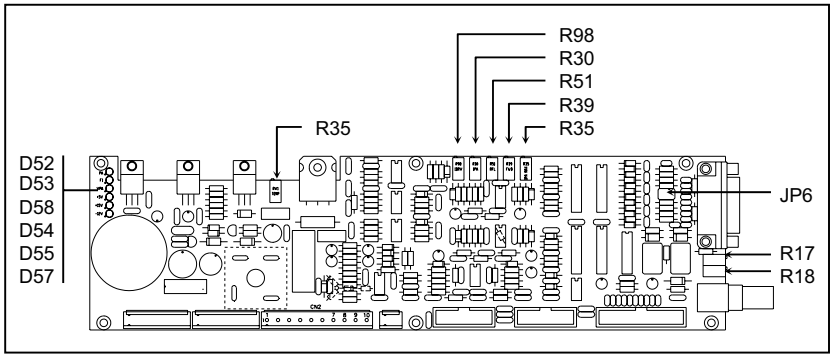
13.1 Power Supply

There are two separate power supply sections.

A first section provides power supply for power final stage. It consists in a switching power supply unit mounted on a cooling fin.



The second section consists in a card mounted on a heat sink located centrally in the machine. This card accommodates the power supply that feeds the different machine cards (audio, CPU...), a section that handles analogue inputs from the "Remote" connector and the automatic power level control system.



13.1.1 Adjustments, settings and indicators

While the switching power supply requires no adjustments, the power supply card accommodates several indicators and adjustable components.

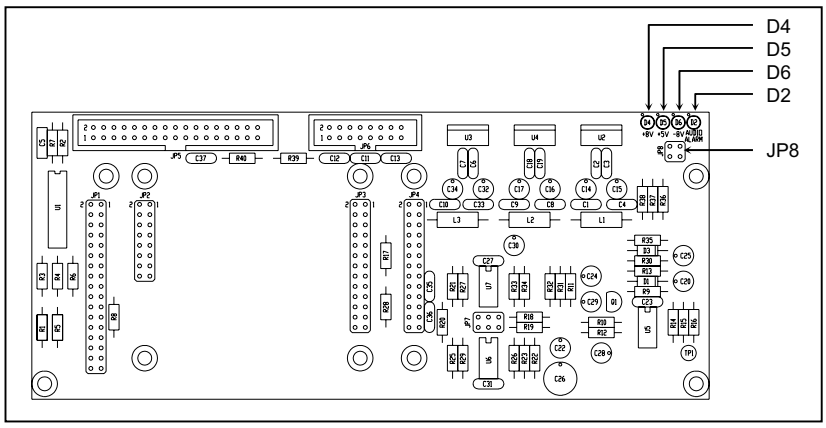
D52 on: power amplifier fuse fault
D53 on: fuse PF1 fault
D54 on: +5V present
D55 on: +15V present
D57 on: -12V present
D58 on: supply voltage present at power supply section
RV1 temperature sensor setting
R17 level adjustment for external AGC
R18 level adjustment for external AGC
R30 PA current measurement adjustment

R35 PA maximum current adjustment
R39 forward power measurement adjustment
R51 reflected power measurement adjustment
R98 driver current measurement adjustment
JP6 1-3, 2-4 the pins on the remote connector are used as analogue inputs
3-5, 4-6 the pins on the remote connector are used for IIC communication

13.2 Audio mainboard

This board provides an interface between audio section and PPL cards and the remaining exciter cards. The audio mainboard is secured to the left bottom section of the machine. The other cards are plugged to the connectors mounted on this board.

This module includes the circuit that mixes MPX signals and SCA/RDS subcarriers.



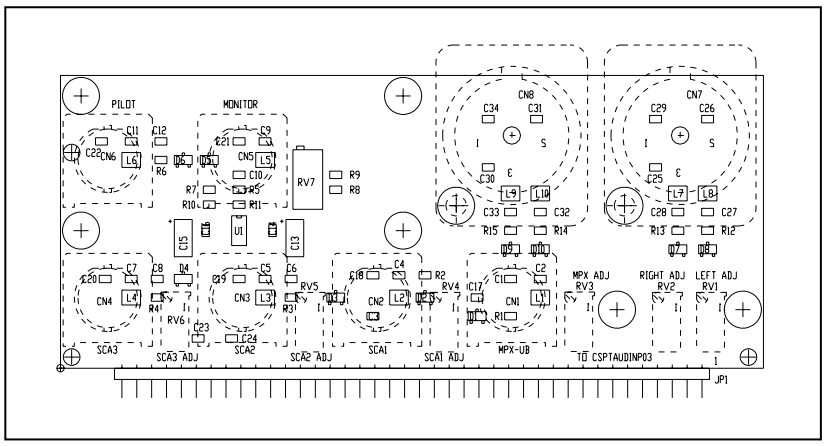
13.2.1 Adjustments, settings and indicators

D2 on: audio missing alarm
D4 on: voltage present
D5 on: voltage present
D6 on: voltage present
JP8 factory setting - do not alter

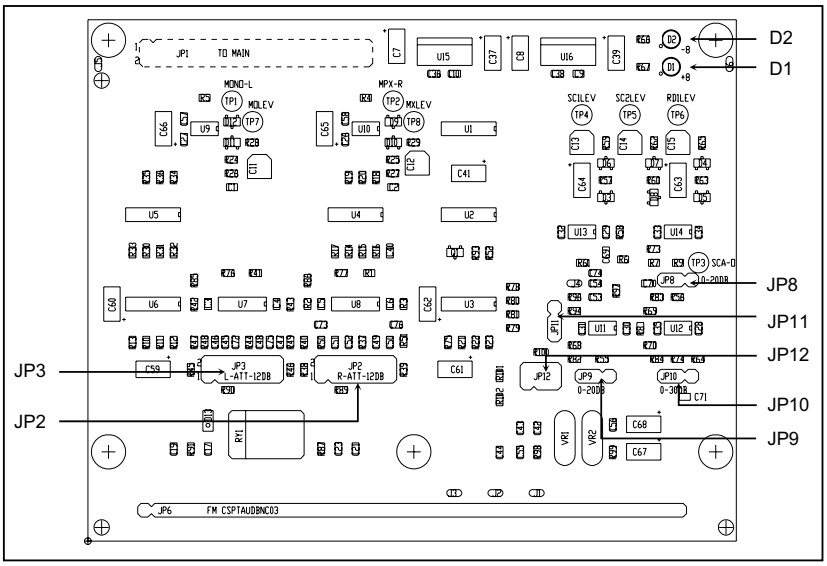
13.3 Audio Inputs

The audio input section is located at the rear end of the machine and is connected directly to the audio mainboard through comb connectors. It is made up of two cards assembled at right angles to give an L-shaped pattern and secured to the rear panel section that accommodates the audio connectors.

The first card holds the level trimmers and the input filters. The second card includes level adjustments and audio configuration software control switches.



After the necessary elaboration (filtering, level adjustment, selection), the audio input section passes the signals on to the audio mainboard, that routes them to the coder card.



13.3.1 Adjustments, settings and indicators

D2	on: power supply negative voltage present
D1	on: power supply positive voltage present
JP3	3-5, 4-6, 9-11, 10-12 no attenuation on input L
	1-3, 2-4, 7-9, 8-10 12 dB attenuation on input L
JP2	same as JP3, affects input R
JP8	1-2 no gain on SCA2, 2-3 20 dB gain
JP11	1-2 MPX_U input impedance 50 Ohm, 2-3 10 kOhm
JP10	1-2 no gain on SCA3, 2-3 30 dB gain
JP9	1-2 no gain on SCA1, 2-3 20 dB gain
JP12	3-5, 4-6 no attenuation on MPX input
	1-3, 2-4 12 dB attenuation on MPX input
RV7	MPX monitor output level adjustment

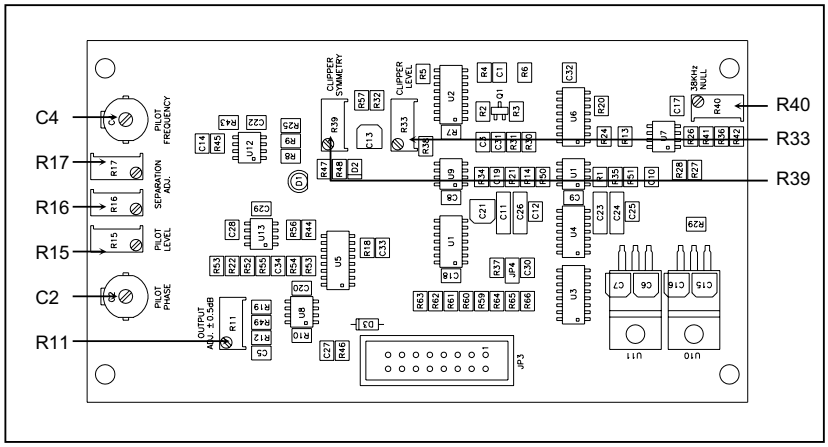
13.4 Coder

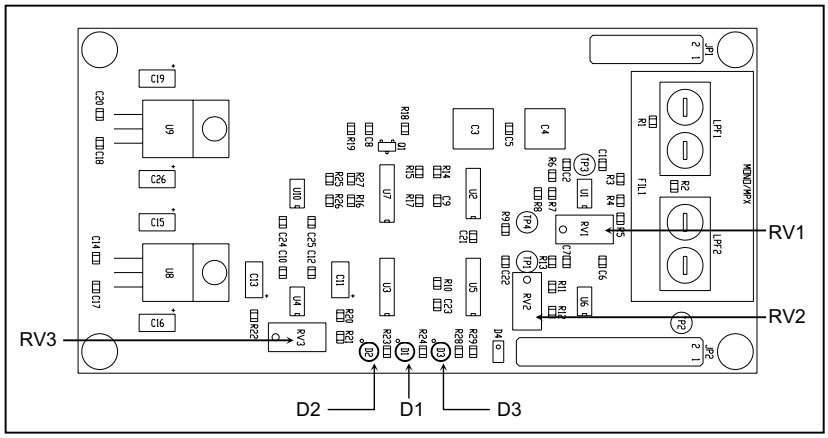
The coder card is mounted above the mainboard between the audio input card and the PLL & Driver card.

This card comes in two versions, namely Stereo and Mono/MPX. The only difference between a Stereo **PTX-LCD** and a Mono/MPX **PTX-LCD** lies in the coder module.

Depending on the version, this card accommodates the low-pass filters, the preemphasis circuits, the stereo coder and the Clipper circuit, which may be enabled or disabled via software.

The Clipper circuit is mandatory in some countries; its purpose is to limit modulation level when audio inputs exceed nominal level.





13.4.1 Adjustments, settings and indicators

Stereo Coder

C2	pilot tone phase
C4	pilot tone frequency
R11	stereo coder card output level
R15	pilot tone level
R16	stereo separation optimisation - left channel
R17	stereo separation optimisation - right channel
R33	clipper circuit operation level
R39	clipper circuit operation symmetry adjustment
R40	optimisation of 38 kHz subcarrier suppression

Mono/MPX card

LP1	low-pass filter 1
LP2	low-pass filter 2
RV1	mono level
RV2	mono coder card output level (deviation)
RV3	clipper circuit operation level
D1	power supply positive voltage presence
D2	power supply negative voltage presence
D3	clipper operating indication

13.5 PLL/Driver card & VCO Card

The PLL/Driver card is located on the left side of the **PTX-LCD** and is plugged into the audio mainboard.

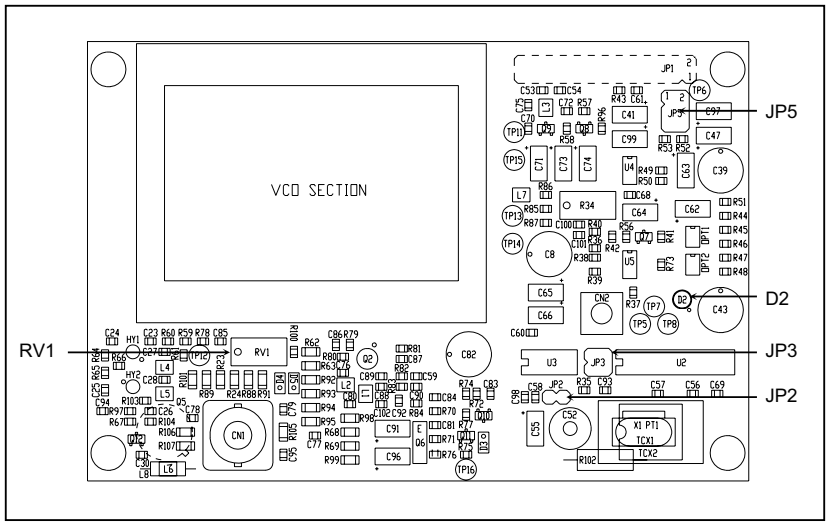
The digital PLL module consists of a high-stability oscillator with temperature control and a digital circuit that divides and compares operating frequency. The oscillator generates a 10 Mhz frequency that is divided to give a fixed 1 kHz signal.

This signal is sent to the digital comparator/divider circuit that compares it to the VCO output signal, which has been divided according to exciter operating frequency.

The comparator AFC output signal is sent to to the varicap diodes mounted on the VCO card and added to the audio signal provided by the Coder card.

The Voltage Controlled Oscillator (VCO) generates the signal on exciter operating frequency; this signal is amplified up to about 300mW (25dBm), which is the necessary level to pilot the R.F. Power Amplifier block.

Note: The VCO card is housed in a silver-plated brass box secured to the PLL & Driver card.



13.5.1 Adjustments, settings and indicators

D2 on: PLL not locked
RV1 bias adjustment
JP2 factory setting - do not alter
JP3 factory setting - do not alter
JP5 factory setting - do not alter

13.6 Power amplifier

The power amplifier is available in a 30W and a 60/100W version.

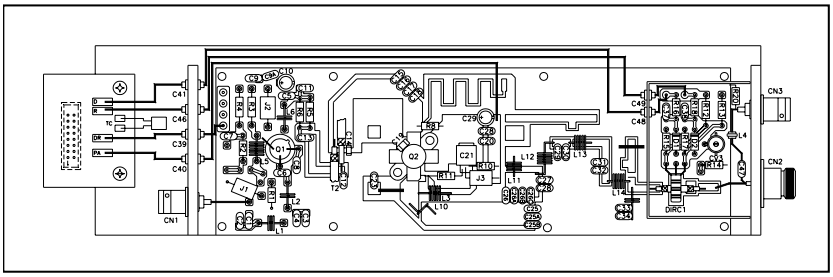
Final power stage is secured to a heat-sink fin in the centre of the device and housed in a fully shielded metal enclosure secured to the central section of the equipment.

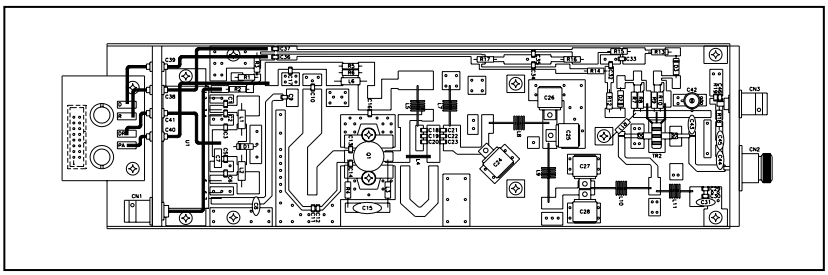
The R.F. signal from the PLL/DRIVER CARD, which is about 200mW, reaches the pilot (MRF237, class C), is amplified up to about 1.5W and sent to the final stage (BLF245) that finally amplifies up to 30W.

The resulting signal is filtered by a low-pass filter to remove harmonic components.

A directional coupler located inside the final stage measures forward and reflected power of the load and sends the relating signals to the power supply for verification.

A -30dB level output for output power is available on a BNC connector located on the rear panel, under the transmitter output connector.

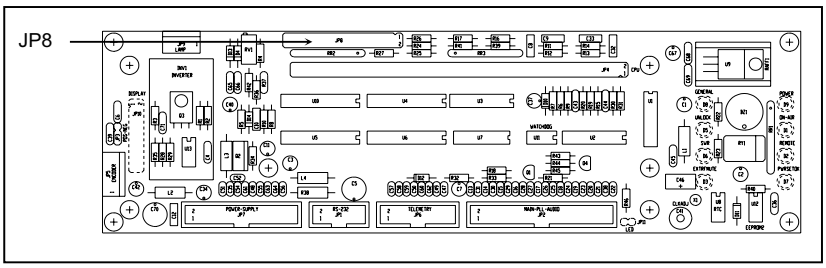




13.7 Panel Card

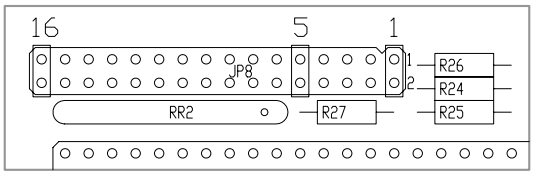
This card is located in the front end of the device and provides an interface between the CPU card and the remaining **PTX-LCD** cards.

This card handles all signals from/to LCD, Encoder, LED Indicators, Power Supply Card, Audio Mainboard and external telemetry card, in other words, all input/output signals of the CPU card.



13.7.1 Adjustments, settings and indicators

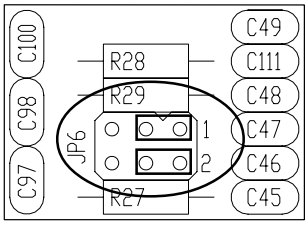
JP8 Position of panel card jumpers.



The software denotes jumper positions as follows (1 signifies a closed jumper, 0 open jumper, X any position):

Jump 5	Jump 6	Jump 7	Jump 8	Jump 9	Jump 10	Jump 11	Jump 12	Jump 13	Jump 14	Meaning
0	0	X	X	X	X	X	X	X	X	ExPwr, ExSts and ExFrq menu disabled
1	0	X	X	X	X	X	X	X	X	ExPwr and ExSts menu enabled, ExFrq menu disabled
0	1	X	X	X	X	X	X	X	X	ExPwr and ExSts menu disabled, ExFrq enabled
1	1	X	X	X	X	X	X	X	X	ExPwr, ExSts and ExFrq disabled
X	X	0	0	0	X	X	X	X	X	Default parameters set in case of exciter reset: CCIR for PLL at 10MHz
X	X	1	0	0	X	X	X	X	X	Default parameters set in case of exciter reset: FCC
X	X	0	1	0	X	X	X	X	X	Default parameters set in case of exciter reset: OIRT
X	X	1	1	0	X	X	X	X	X	Default parameters set in case of exciter reset: Japan
X	X	0	0	1	X	X	X	X	X	Default parameters set in case of exciter reset: Italia
X	X	1	0	1	X	X	X	X	X	Default parameters set in case of exciter reset: CSI
X	X	0	1	1	X	X	X	X	X	Reserved for future applications
X	X	1	1	1	X	X	X	X	X	Reserved for future applications
X	X	X	X	X	1	X	X	X	X	MAINS alarm enabling. NOTE: in this case is necessary to move the two jumpers from positions 3-5 and 4-6 to the positions 1-3 and 2-4, of Supply card JP6 jumper(see fig. below)
X	X	X	X	X	X	1	X	X	X	TRDSP optional card presence
X	X	X	X	X	X	X	1	X	X	13 MHz Quartz frequency on PLL card
X	X	X	X	X	X	X	X	1	X	Telemetry optional card presence
X	X	X	X	X	X	X	X	X	1	SFN software version (only for TRDSP)

1) In case of **ExFrq enabled** is necessary to modify the jumper JP6 on power supply, as indicated in the following figure, in order to enabled the alternatives frequencies that shall be used when the exciter is used as backup in a N+1 system.
2) In case of **MAINS alarm enabled** is necessary to modify jumper the JP6 on power supply, as indicated in the following figure, in order to validate the activation of the alarm.



Example relating to MAINS ON on power supply card

13.8 CPU card (16-bit)

The CPU card is located at the front end of the device and is secured to the panel card.

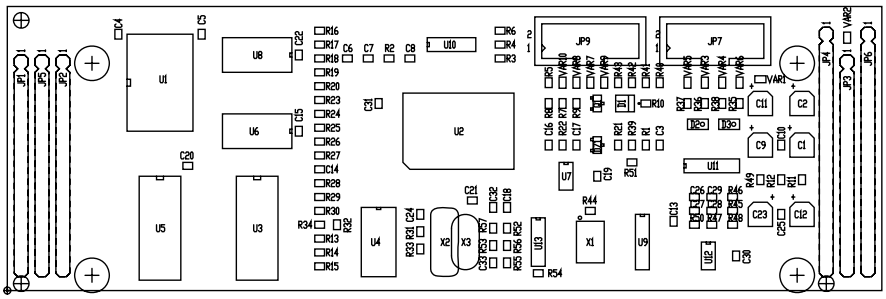
This card is the heart of the transmitter as it handles and processes all information provided by the other cards and by other devices connected through the serial interface or the telemetry card.

The 1Mb Flash Memory enables firmware update through direct connection of **PTX-LCD** RS232 output to the serial port of a PC.

Card specifications are as follows:

- **Microprocessor:** 90F5436
- **Flash Memory size:** 1MBytes
- **Static RAM size:** 32KBytes
- **Communication Interface:** RS232-RS485 and I^2C Bus
- **EEPROM size:** 2KBytes
- **Self-diagnosis LED:** 1 red led

The card requires no settings or adjustments.



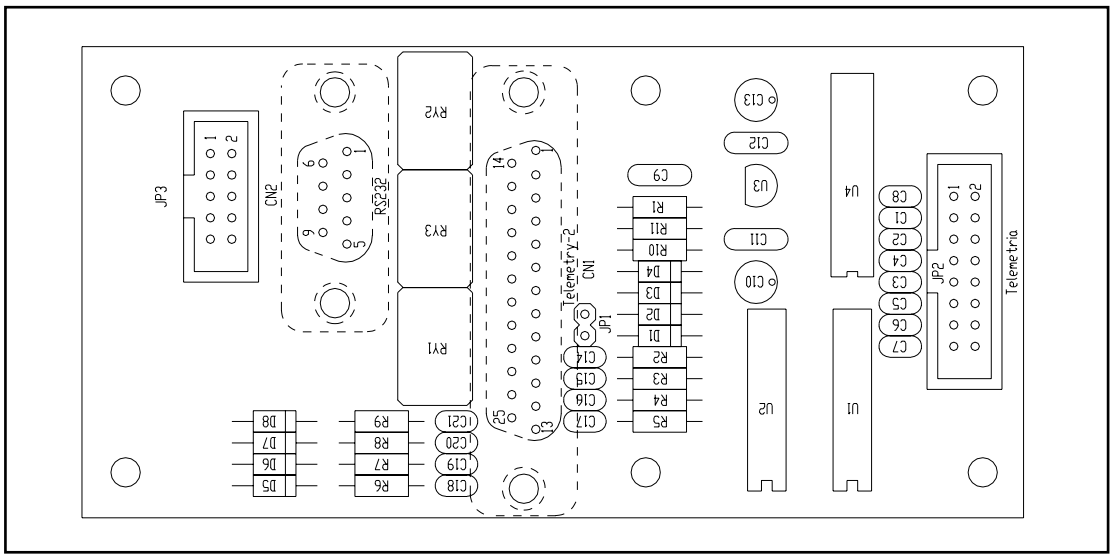
13.9 Telemetry card “SLTELEM00001” (optional)

This card has a female DB25 connector that can be accessed on the machine rear panel.

This card provides 8 programmable customized alarms that are discussed in paragraph 9.1.

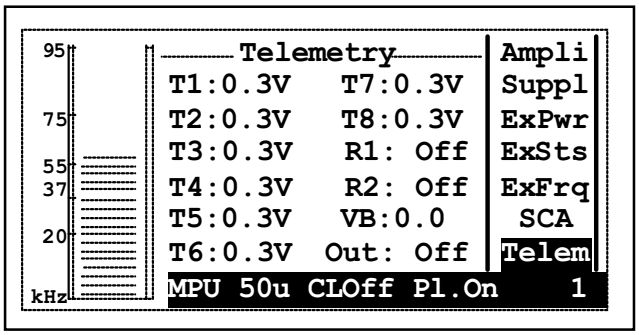
This card enables user access to "TELEM" Menu measurements and controls. It can measure 8 analogue inputs from 0 to 5 V; it also controls two digital outputs that use relay contacts and an open-collector digital output.

The card requires no settings or adjustments.



13.9.1 Telemetry

This optional menu displays the state of the optional add-on telemetry card.



If the telemetry is not fitted, displayed values are not applicable. If the relevant option is installed (and the card 25-pin connector is fitted at the rear of the machine), the fields have the following meanings.

T1 voltage on pin **9** of telemetry card input connector.

T2 voltage on pin **22** of telemetry card input connector.

T3 voltage on pin **10** of telemetry card input connector.

T4 voltage on pin **23** of telemetry card input connector.

T5 voltage on pin **11** of telemetry card input connector.

T6 voltage on pin **24** of telemetry card input connector.

T7 voltage on pin **12** of telemetry card input connector.

T8 voltage on pin **25** of telemetry card input connector.

R1 service relay 1 enable/disable.

R2 service relay 2 enable/disable.

VB battery supply voltage (only if optional **24 volts** card is fitted).

OUT supplemental service output (to control an external circuit).

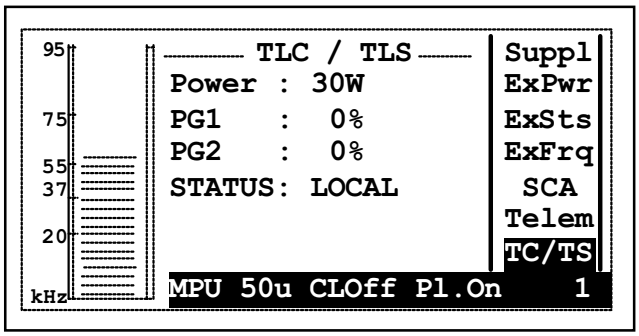
13.10 Telemetry card “SLTELEM00002” (optional)

The customized **PTX-LCD** version is supplied with telemetry card SLTELEM00002 as standard; this card provides a parallel interface similar to that of other RVR Elettronica devices (PJ series amplifiers, HC series couplers).

The Pin 13 of the DB25 connector signifies "RF Enable" (interlock) and must be closed to ground to enable machine power output. Normally, this is accomplished by using an optional external "Power Good" card, device ESTX300, or a simple DB25 connector with pin 13 closed to ground (pin 3, 7 or 21).

13.10.1 TLC/TLS

When the telemetry card "SLTELEM0002" is used, the following menu is enabled.



`Power` This line provides a settable software limit for the **PTX-LCD** maximum output power. Available options are "100 W" (no limit) and "30 W" (maximum PTXLCD output nearly 30 W).

`PG1` Threshold level for "Power good 1" signal. Level is expressed in percent of set power level. Output PG1 of the telemetry card is on when **PTX-LCD** actual output power exceeds this percentage of set power. For example: Assuming that power set in the default menu is 70% of machine rated power (70% x 100W = 70W) and PG1 is set to 80% in the menu under discussion, the PG1 output at PIN 9 of the telemetry card will be on when actual output power exceeds 80% x 70W = 56W.

`PG2` Threshold level for "Power good 2" signal. Level is expressed in percent of set power level. Output PG2 at PIN 22 of the telemetry card is on when PTXLCD actual output power exceeds this percentage of set power. PG2 operates on the same logic as PG1.

STATUS Display and setting of the **PTX-LCD** mode of operation. "Local" or "Remote". When the machine is placed in "Local" mode, all settings included in the software are available (for example, frequency, power or audio levels), whereas the telemetry card inputs are inhibited. In the "Remote" mode, no changes may be made from machine menus (except returning to "Local" mode) and telemetry card inputs are enabled.

13.11 AUDINP-DIG Card (option)

The "/AUDINP-DIG" option permits to the **PTX-LCD** exciter the integration into systems using digital audio distribution.

This option is designed to replace the typical audio input section with no need for particular adjustments; no changes to exciter firmware (Releasexx04xxxx) are required after an update.

If present, a digital input will be automatically selected by the supplied logic.

Analogue (instead of digital) input selection can be forced using an external command.

A manual switch is available to choose between the balanced (AES/EBU) and unbalaced (TOSLINK and S/PDIF) digital input.

Two trimmers adjust converted digital input level to normalize R and L signals with respect to analogue input regulated level.

The D/A conversion is performed automatically by 24 bit converters using a sampling frequency from 32 to 96 KHz.

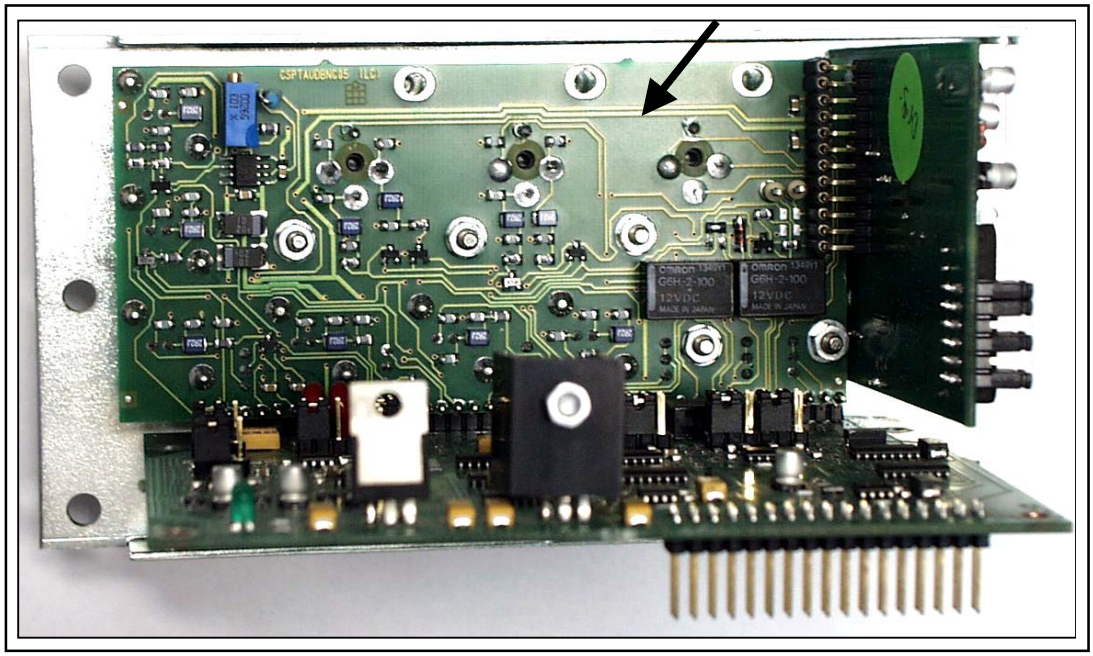
This option supports data formats S/PDIF, AES/EBU, IEC958 and EIAJ CP340/1201.

13.11.1 Functions description

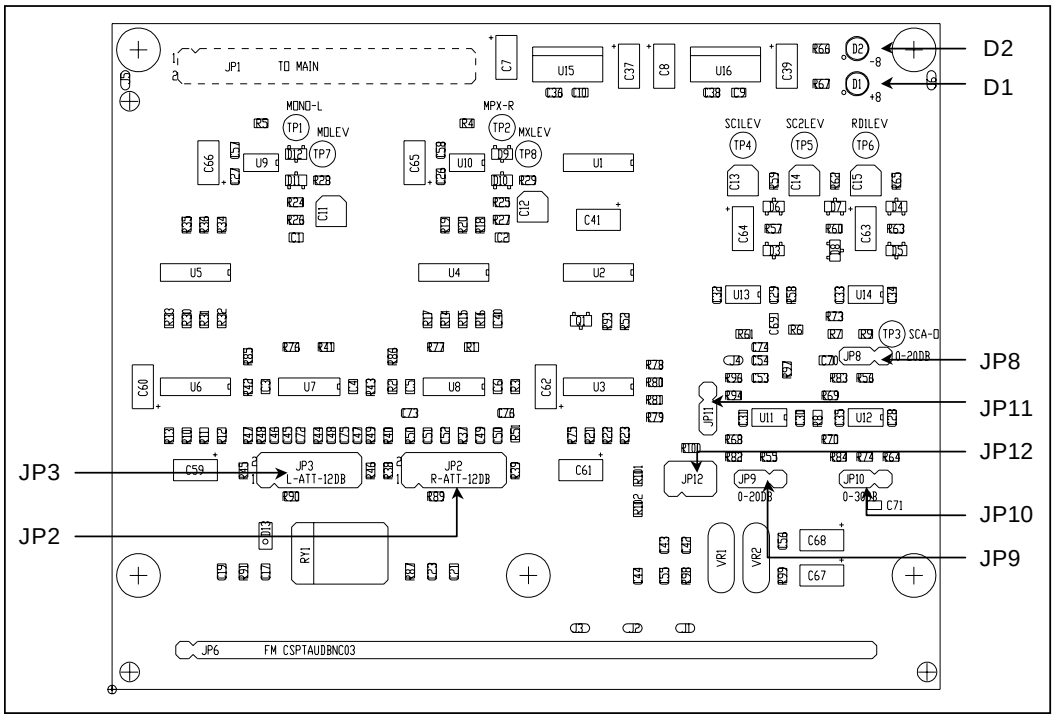
The optional section is located in the **PTX-LCD** rear panel and is connected directly to the audio mainboard via a strip line connector. It includes three different cards.

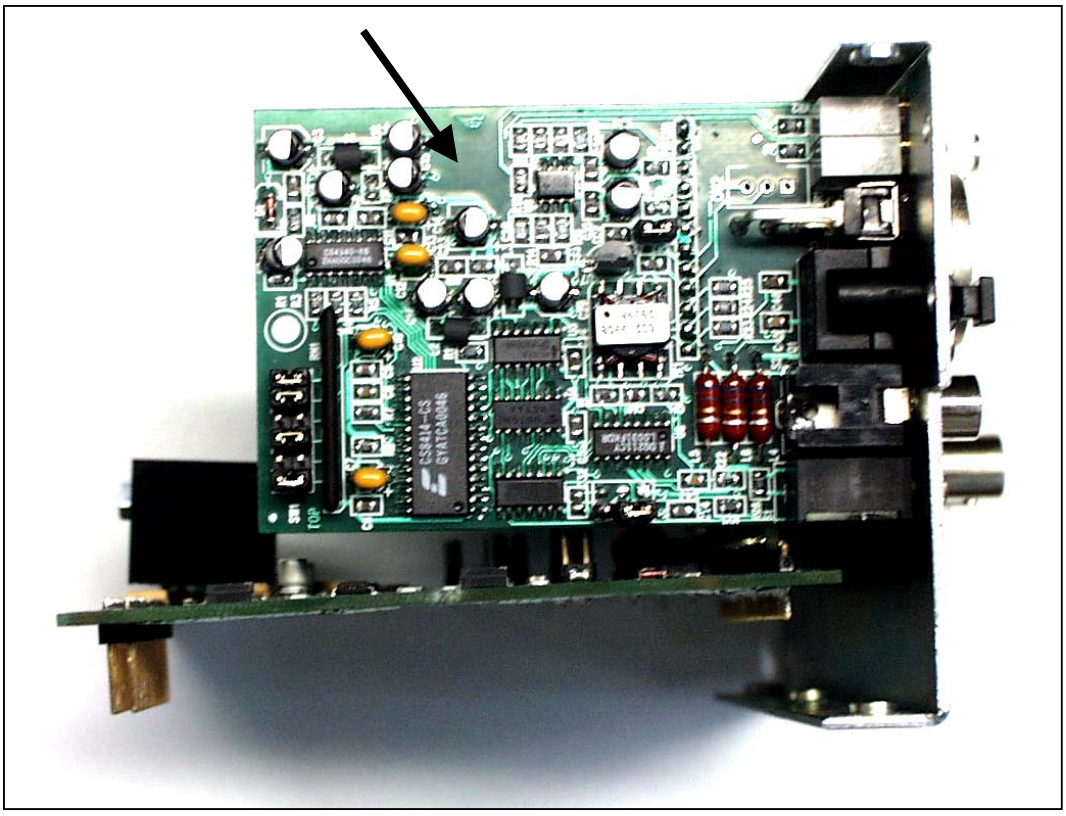
The system provides for twelve cyclic system queries that enable quick fault location. If queries are not successful, a FAULT signal is sent to the CPU card that will take the necessary action to prevent additional faults.

The first card contains the balanced analogue inputs and the level trimmers for all analogue inputs and their filters; this is the same card used in PTX-LCD without AUDINP-DIG. The second card accommodates level adjustments and the software-based audio configuration switches. The third section helps convert the digital signal to "Left" and "Right" analogue signal and includes a matching level trimmer. This section also enables digital or analogue input selection: digital inputs are selected by default where fitted, whereas analogue inputs are selected using the Digital/Analog switch jack connector. A manual switch is available to choose between the balanced (AES/EBU) and unbalanced (TOSLINK and S/PDIF) digital input.



After the necessary elaboration (filtering, level adjustments, D/A conversion, selection), the audio input passes the signal on to the mainboard that routes it to the coder card.


D2
D1
JP8
JP11
JP12
JP10
JP9
JP3
JP2
JP1 TO MAIN
MONO-L
MPX-R
MDLEV
MXLEV
SCILEV
SC2LEV
RDILEV
JP3 L-ATT-12DB
JP2 R-ATT-12DB
JP9 0-20DB
JP10 0-30DB
JP6 FM CSPTAUDBNC03



13.12 TRDSP card (optional)

Option TRDSP is a DSP-based digital circuit that performs the following tasks:

- input selection, level adjustment and processing (filtering and preemphasis)
- stereophonic coding
- RDS (Radio Data System) signal generation.

The TRDSP accepts audio inputs in digital form (AES/EBU) or Left and Right analogue inputs that are immediately converted into digital format (A/D). A digital input is automatically selected when present, but analogue input selection can be forced with the appropriate software settings.

The MPX stereophonic signal " ("Main", "Sub" and 19 kHz subcarrier) is generated directly in digital form, starting with the Left and Right digital (or digitalised) channels.

The RDS is generated directly by DSP and then digitally added to the stereophonic audio signal. The messages transmitted by the RDS coder are programmed using a PC software supplied with the machine. It also possible to disable the internal RDS coder and use an external coder.

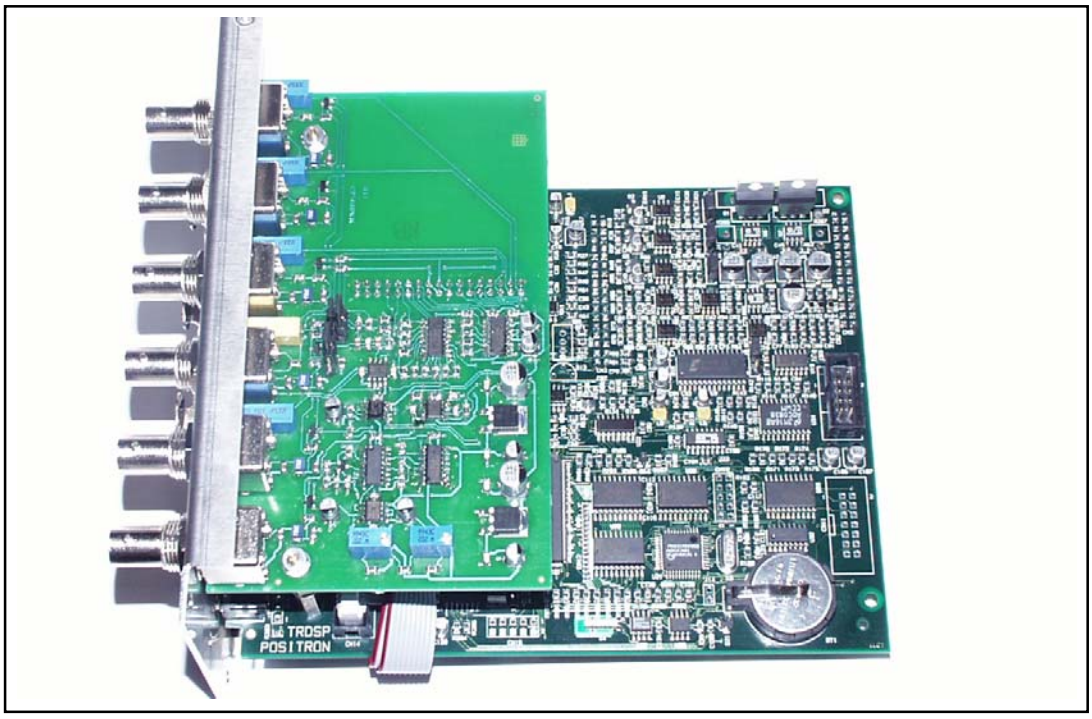
The TRDSP option includes two electronic cards and a support panel with the input and output connectors. This subassembly is installed into **PTX-LCD** in place of the audio input and stereo coder sections (or Mono/MPX card). It can be easily retrofitted to standard **PTX-LCD** exciters.

The key advantage offered by the TRDSP option is enhanced performance in terms of:

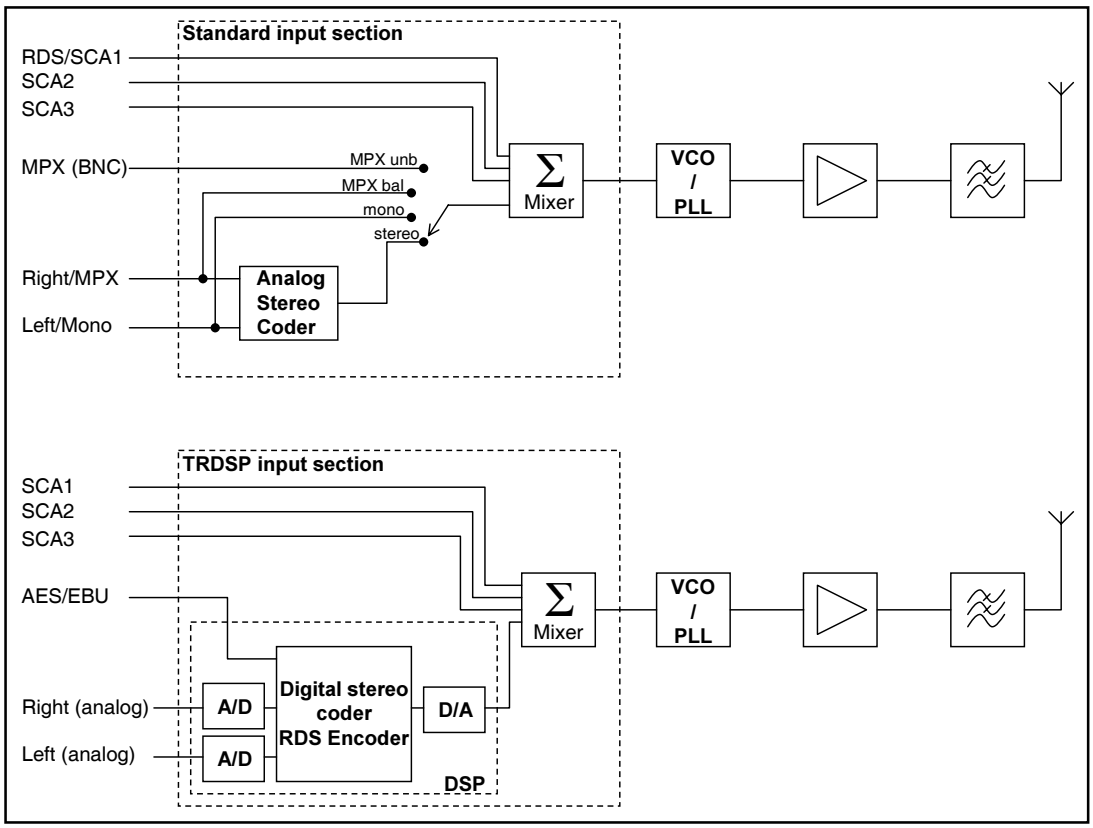
- Amplitude/frequency response (±0.01 dB, 30 Hz - 15 kHz)
- Stereophonic separation (65 dB, 30 Hz - 15 kHz)
- Distortion (< 0.03%)

In addition, the digitally processed signal enables frequency deviation limitation while avoiding the distortion issues typically experienced with analogue clippers.

At TRDSP output, the total signal (MPX + RDS) is converted into analogue form (D/A) and passed on to the standard VCO/PLL section of **PTX-LCD**.



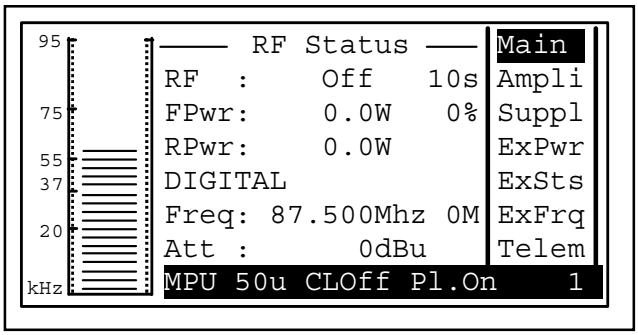
The block diagrams of a standard PTX-LCD exciter and a PTX-LCD equipped with TRDSP are compared in the figure below, with special regard to the input card.



13.12.1 Operating system and TRDSP

When TRDSP is installed, new screens are added to the administration menu to handle the key operating parameters of the card.

13.12.1.1 RF Status



`RF` RF power output On / Off. Reading and setting of time taken by PTX to reach set power; setting range 1 to 100s

`FPwr` Output power reading and setting. Reading is expressed in Watts, whereas setting is in percentage of maximum power. If the encoder is pressed when the cursor is on this option, measurement unit label changes from "W" to "%" and the desired percentage can be set by turning the encoder. Press the encoder to store the new setting.

`RPwr` Reflected power reading in watts.

`DIGITAL`

Mode of operation of TRDSP card.

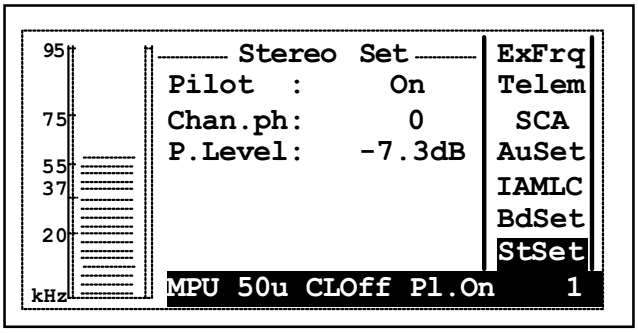
`0%` Output power setting in percent.

`Freq` Operating frequency. Press the encoder when this parameter is highlighted and then turn the encoder to change frequency value. When the encoder is pressed to store the new frequency setting, the software will prompt for a confirmation (“`Are you sure?`”).). Highlight “`Yes`” and press the encoder to confirm the new frequency setting or select “`No`” to abandon change. Value “0M” near the MHz indication identifies the current frequency selection (set from menu “ExFrq”) in the event the frequency switching feature is on (switching occurs based on the voltages present at connector DB15).

`Att` Gain set at audio inputs.

13.12.1.2 Stereo Set

Configuration menu for stereo coder card (where relevant option is installed).



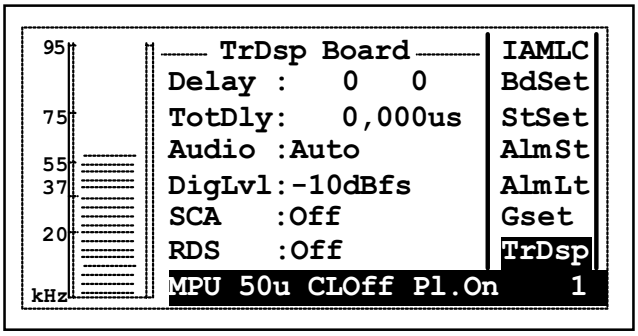
`Pilot` Add/remove pilot tone (convenient for some types of measurements).

`Chan.ph` Right channel phase, may be 0 or 180 (signal reversal, convenient when measuring "Sub to Main")

`P.Level` Pilot tone phase adjustment from -32.8dB to -7.3 dB (only available if PTX-LCD has the optional TRDSP card installed)

13.12.1.3 TrDsp

Optional TrDsp card setup menu.



`Delay` Signal time delay setting, when used for isofrequency applications with poor step adjustment. The setting range for the first parameter is from 0 to 1900 steps of 5,25 μs each. The second parameter range is from 0 to 127 steps of 0,05 μs. The maximum time delay that can be set is 5.47 milliseconds. The actual time delay set is shown under item "Totdly"; it is expressed in microseconds up to a maximum value of 9981,35μs.

If **PTX-LCD** is interfaced with a GSM modem, parameter DELAY can be set via SMS.

Two SMS commands are available: DELAY and STEP. DELAY is used to set delay in microseconds. For example, message "DELAY 624" would set delay to 624 μs (with some minor approximation). STEP is used to make corrections in steps of 0.05 μs each (+ or -). For example, message "STEP +10" adds 0.5 μs to the time delay set previously, giving 624.5 μs. The **PTX- LCD** sends back an SMS message that contains total time delay set, for example "Total Delay Set: 624.5 μs".

TELECON adds two items to the "General" window: "Delay 1" and "Delay 2 ". They can be adjusted in steps; meaning is as outlined above.

`Audio` Input channel mode selection; possible options are digital, analogue or automatic mode.

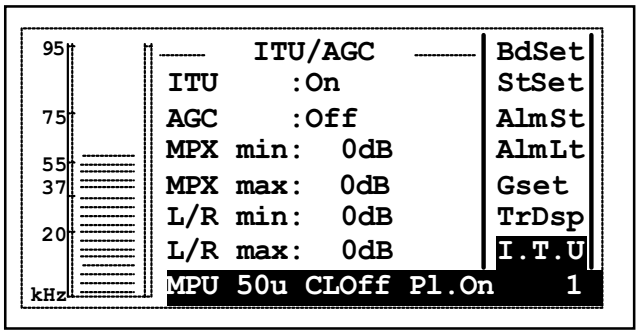
`DigLvl` Digital audio input level setting. It can be adjusted in 1 dBm steps from 0 to -10 dBfs.

`SCA` Software switch to enable or disable the SCA inputs of the RDS coder.

`RDS` Software switch to enable or disable the RDS coder.

13.12.1.4 I.T.U.

I.T.U. and A.G.C. (Automatic Gain Control) feature setup menu.



`ITU` Enables automatic reduction of signal modulation energy according to standard I.T.U. 412. This feature is always given priority over the A.G.C. feature.

`AGC` Mean operation time for Automatic Gain Control. Available options are "OFF", "SLOW", "MIDDLE" and "FAST" mode.

`MPX min`
Minimum audio level operation threshold in the MPX mode; A.G.C. kicks in when threshold is exceeded; range is 0 to -4 dB.

MPX max

Maximum audio level operation threshold in the MPX mode; A.G.C. kicks in when threshold is exceeded; range is 0 to +4 dB.

L/R min

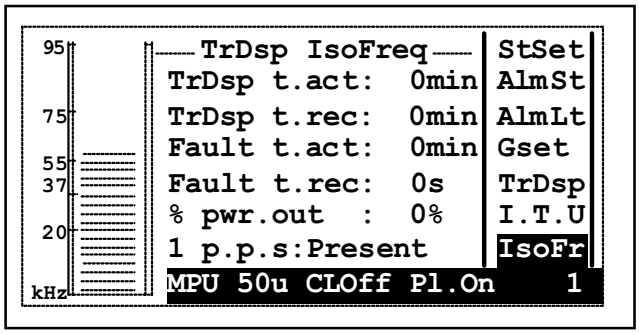
Minimum audio level operation threshold in the Mono/Stereo mode; A.G.C. kicks in when threshold is exceeded; range is 0 to -12 dB.

L/R max

Maximum audio level operation threshold in the Mono/Stereo mode; A.G.C. kicks in when threshold is exceeded; range is 0 to +12 dB.

13.12.1.5 Isofreq

Setup menu for PTX-LCD isofrequency mode operating parameters.



TrDsp t.act

Hysteresis setting for automatic power reduction activation, adjustable from 0 to 120minutes. After the set time has elapsed, power is reduced by the specified percent. The timer starts counting the sync loss reported by the TRDSP card; this feature activates when sync loss duration exceeds set time.

TrDsp t.rec

Power restore hysteresis time setting, can be adjusted from 0 to 120 minutes. Principle of operation is as described above; when back in sync, PTX LCD goes back to delivering the same output power as before reduction .

Fault t.act

Hysteresis setting for automatic power reduction activation, can be adjusted from 0 to 6 hours in 6 min. steps. After the set time, power is reduced by the specified percent. The timer starts counting the sync loss caused by an external "FAULT" indication (e.g.: problems with GPS antenna, etc..), which must persist longer than set time in order for the related feature to activate. Fault signal is provided by PIN4 of the telemetry DB15 connector (see sect. 6.6.1).

Fault t.rec

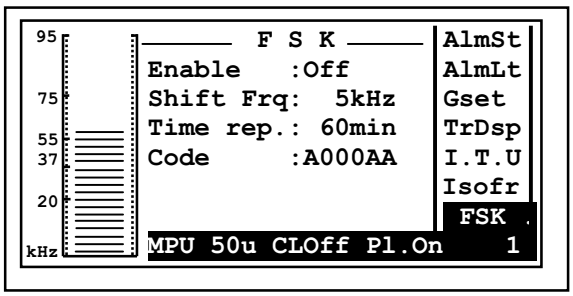
Power restore hysteresis time setting, can be adjusted from 0 to 6 hours. Principle of operation is as described above; when back in sync, the **PTX-LCD** goes back to delivering the same output power as before reduction .

% pwr.out Power reduction percent of power set in menu "RF Status" under item FPwr. For example, if % pwr.out is set to 50%, and item FPwr in "RF Status" menu is set to 30% of power output, resulting output is 15%.

These parameters can also be set using the "Telecon" software. If power reduction occurs when "low FWD Power" alarm is active, an SMS message that reads "ALARM: low FWD power - Out of Sync" is transmitted.

13.12.1.6 FSK

The **PTX-LCD** operating parameter setup menu for FSK signalling, in which a Morse-coded 6-character alphanumeric code is sent at regular intervals using transmission frequency shift.



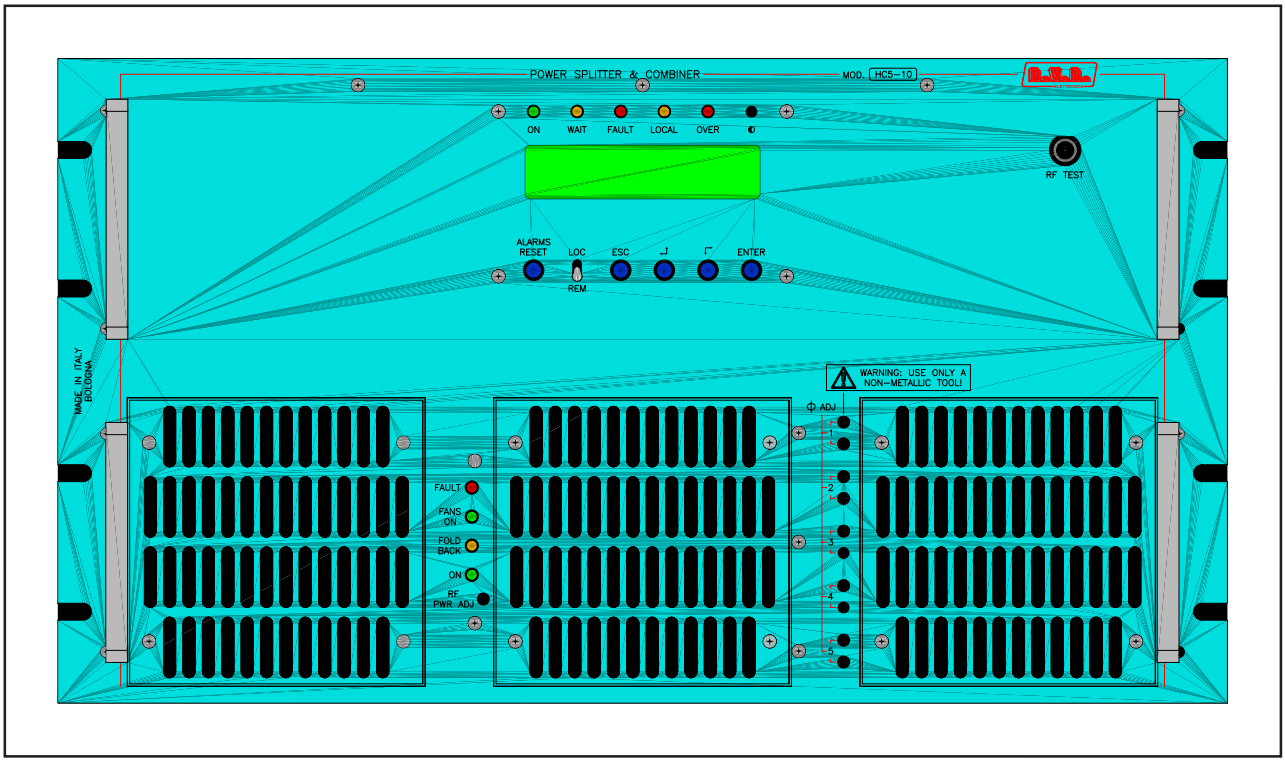
Enable Enables / disable the FSK feature.

Shift Frq Frequency shift with respect to carrier, can be adjusted from 5 to 25 KHz.

Time rep. Repetition time for Morse code transmission, can be adjusted from 0 to 240 minutes.

Code Morse Code sended (composed from a character, three figures and two characters)

HC5-10



User Manual

Volume 1

Manufactured by R.V.R. ELETTRONICA **Italy**

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HC5-10 - Manuale Utente
Versione 1.0

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1. Preliminary Instructions

This manual is written as a general guide for those having previous knowledge and experience with this kind of equipment, well conscious of the risks connected with the operation of electrical equipment.

It is not intended to contain a complete statement of all safety rules which should be observed by personnel in using this or other electronic equipment.

The installation, use and maintenance of this piece of equipment involve risks both for the personnel performing them and for the device itself, that shall be used only by trained personnel.

R.V.R. Elettronica SpA doesn't assume responsibility for injury or damage resulting from improper procedures or practices by untrained/unqualified personnel in the handling of this unit.

Please observe all local codes and fire protection standards in the operations of this unit.

WARNING: always disconnect power before opening covers or removing any part of this unit. Use appropriate grounding procedures to short out capacitors and high voltage points before servicing.

WARNING: this device can irradiate radio frequency waves, and if it's not installed following the instructions contained in the manual and local regulations it could generate interferences in radio communications. This is a "CLASS A" equipment. In a residential place this equipment can cause hash. In this case can be requested to user to take the necessary measures.

R.V.R. Elettronica SpA reserves the right to modify the design and/or the technical specifications of the product and this manual without notice.

2. Warranty

Any product of **R.V.R. Elettronica** is covered by a 24 (twenty-four) month warranty.

For components like tubes for power amplifiers, the original manufacturer's warranty applies.

R.V.R. Elettronica SpA extends to the original end-user purchaser all manufacturers warranties which are transferrable and all claims are to be made directly to **R.V.R.** per indicated procedures.

Warranty shall not include:

1 Damage while the equipment is being shipped to R.V.R. for repairs;

2 Any unauthorized repair/modification;

3 Incidental/consequential damages as a result of any defect

4 Nominal non-incidental defects

5 Re-shipment costs or insurance of the unit or replacement units/parts

Any damage to the goods must be reported to the carrier in writing on the shipment receipt.

Any discrepancy or damage discovered subsequent to delivery, shall be reported to **R.V.R. Elettronica** within **5** (five) days from delivery date.

To claim your rights under this warranty, you shold follow this procedure

1 Contact the dealer or distributor where you purchased the unit. Describe the problem and, so that a possible easy solution can be detected.

Dealers and Distributors are supplied with all the information about problems that may occur and usually they can repair the unit quicker than what the manufacturer could do. Very often installing errors are discovered by dealers.

2 If your dealer cannot help you, contact R.V.R. Elettronica and explain the problem. If it is decided to return the unit to the factory, **R.V.R. Elettronica** will mail you a regular authorization with all the necessary instructions to send back the goods.

3 When you receive the authorization, you can return the unit. Pack it carefully for the shipment, preferably using the original packing and seal the package perfectly. The customer always assumes the risks of loss (i.e., R.V.R. is never responsible for damage or loss), until the package reaches R.V.R. premises. For this reason, we suggest you to insure the goods for the whole value. Shipment must be effected C.I.F. (PREPAID) to the address specified by R.V.R.'s service manager on the authorization

DO NOT RETURN UNITS WITHOUT OUR AUTHORIZATION AS THEY WILL BE REFUSED

4 Be sure to enclose a written technical report where mention all the problems found and a copy of your original invoice establishing the starting date of the warranty.

Replacement and warranty parts may be ordered from the following address. Be sure to include the equipment model and serial number as well as part description and part number.

R.V.R. Elettronica SpA
Via del Fonditore, 2/2c
40138 BOLOGNA
ITALY
Tel. +39 051 6010506

3. First Aid

The personnel employed in the installation, use and maintenance of the device, shall be familiar with theory and practice of first aid.

3.1 Treatment of electrical shocks

3.1.1 If the victim is not responsive

Follow the A-B-C's of basic life support

- Place victim flat on his backon a hard surface.
- Open airway: lift up neck, push forehead back (**Figure 1**).
- clear out mouth if necessary and observe for breathing
- if not breathing, begin artificial breathing (**Figure 2**): tilt head, pinch nostrils, make airtight seal, four quick full breaths. Remember mouth to mouth resuscitation must be commenced as soon as possible

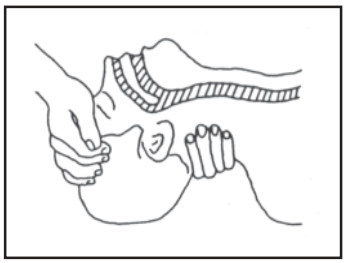


Figure 1

Figure 2

- Check carotid pulse (**Figure 3**); if pulse is absent, begin artificial circulation (**Figure 4**) depressing sternum (**Figure 5**)

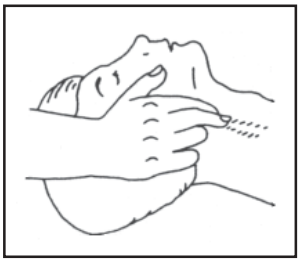


Figure 3

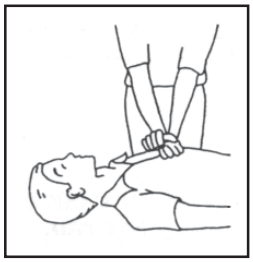


Figure 4

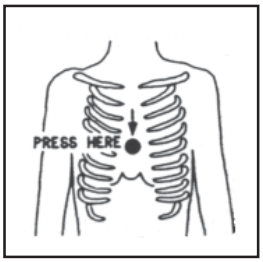


Figure 5

- In case of only one rescuer, 15 compressions alternated to two breaths.
- If there are two rescuers, the rythm shall be of one brath each 5 compressions.
- Do not interrupt the rythm of compressions when the second person is giving breath.
- Call for medical assistance as soon as possible.

3.1.2 If victim is responsive

- Keep them warm
- Keep them as quiet as possible
- Loosen their clothing (a reclining position is recommended)
- Call for medical help as soon as possible

3.2 Treatment of electrical Burns

3.2.1 Extensive burned and broken skin

- Cover area with clean sheet or cloth
- Do not break blisters, remove tissue, remove adhered particles of clothing, or apply any salve or ointment.
- Treat victim for shock as required.
- Arrange transportation to a hospital as quickly as possible.
- If arms or legs are affected keep them elevated

If medical help will not be available within an hour and the victim is conscious and not vomiting, give him a weak solution of salt and soda: 1 level teaspoonful of salt and 1/2 level teaspoonful of baking soda to each quart of water (neither hot or cold). Allow victim to sip slowly about 4 ounces (half a glass) over a period of 15 minutes. Discontinue fluid if vomiting occurs.

DO NOT give alcohol

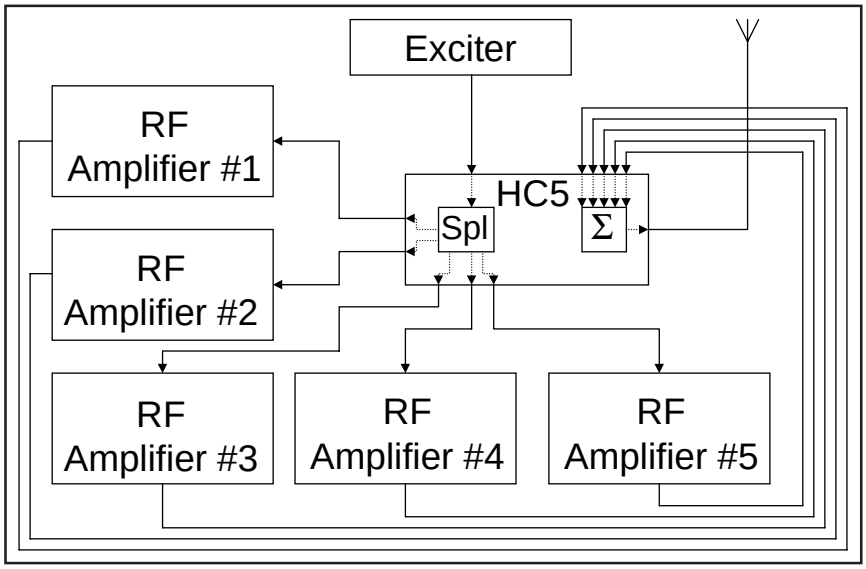
3.2.2 Less severe burns

- Apply cool (not ice cold) compresses using the cleansed available cloth article.
- Do not break blisters, remove tissue, remove adhered particles of clothing, or apply salve or ointment.
- Apply clean dry dressing if necessary.
- Treat victim for shock as required.
- Arrange transportation to a hospital as quickly as possible
- If arms or legs are affected keep them elevated.

4. General Description

The **HC5-10**, produced by R.V.R. Elettronica, is a hybrid coupler at 5 way that allows to join up to 5 R.F. power amplifier. Its function is to split the RF signal coming from a RF exciter, adjusting the relative phases, to pass them through five external RF power amplifiers and then to combine the output of the amplifiers into a single RF amplified signal to be forwarded to the antenna output.

The **HC5-10** is produced in the version for five transmitters of 2 kW max output power everyone (for example PJ2000M-C), for a total nominal power of 10 kW.



The nominal working principle of a FM transmitter based on a hybrid coupler scheme like **HC5-10**, foresees that the used amplifiers shall produce the same RF power that will be added with the same phase. Possible differences in the power level or phase of the amplifiers generate the so-called *unbalancement power* that is in part dissipated inside the coupler. The **HC5-10** guarantees the overall working of the transmitter even if one of the amplifiers is completely off-service. In such case, the power generated by the surviving amplifier is routed to the antenna anyway; the other part of the delivered power (that is unbalancement power) is dissipated inside the combiner.

The **HC5-10** is controlled by a microcontroller system, that includes a LCD display and a series of keys for the interaction with the user, that realizes the following functions:

- Measurement and visualization of the coupler's working parameters
- Activation and deactivation of the power output of the system
- Protection of the coupler with respect to potentially dangerous situations like exceeding emitted or unbalancement power, overdrive or overtemperature
- Detection of user-settable attention thresholds (e.g. output power being below a certain value), that are made externally available as digital states on the "telemetry" connector
- Communications with external devices

The management software of the **HC5-10** is based on a menu system.
The user can navigate through the menu system using four buttons, ESC, move LEFT/UP, move RIGHT/DOWN and ENTER. A fifth button is used to reset the alarm counters, if any alarm has been triggered before.

The state of the machine comes indicated from nine LEDs present on the frontal panel.

A switch on the front panel allows to select the LOCAL or REMOTE working mode:

- LOCAL mode allows to control the machine using the buttons on the front panel, while remote control (that is using the telemetry connector) is disabled;
- In REMOTE mode, remote control is enabled, while the buttons on the front panel can be used only to read parameters and not to change them

The LOCAL working mode is signalled by a yellow LED on the front panel being lit.

The different working parameters are made available for the remote control applications on the telemetry connector, as voltage levels that are proportional to the value of the parameter under consideration. Digital output signals related to alarms or warnings are also present on the connector, together with the digital input like ON/OFF switching or alarms reset.

The HC5 can be connected to the exciter of the transmitter using a “interlock” cable, so that it is possible for it to deactivate RF power emission in case of misfunctioning of the transmitting system. An analogous effect can be reached also in case the exciter misses the interlock functionality, connecting the mains supply of the exciter to the auxiliary mains plug of the **HC5-10** “AUX OUT AC LINE”. This plug is in fact opened using a relay under the same conditions that cause the activation of the interlock.

5. Quick reference to instalaltion and use

This chapter is intended to summarize the necessary points for the installation of the device. In case any of the arguments is unclear, for example when you use the combiner for the first time, we suggest to carefully read the whole manual.

5.1 Preparation

Unpack the **HC5-10** and before any other operation check the unit for any shipping damage; in particular, check that all the controls and connectors on the front and rear panels are in good conditions.

Inside the **HC5-10** are inclusive:

- Nr. 1 5-way RF splitter;
- Nr. 1 5-way RF combiner;
- Service electronic circuits that control the entire system composed of HC5-10 with Nr. 5 2kW amplifiers connected (for example PJ2000M-C);
- Connection cables for the RF input signals of each amplifier;
- Connection cables for the RF output signals of each amplifier;
- Connection cables for the signals that exchange the **HC5-10** combiner and the PJ2000M-C amplifier. In the case the cable is not in good conditions or doesn't come connected, the combined system is not able to manage the various parameters interconnected correctly. This condition involves a high probability to create permanent damages to the load of **HC5-10**.

If it is necessary, check the integrity and the value of the fuse inside the voltage changer block; the required fuse type is:

- Aux Fuse 10A
- Mains fuse 10A

Connect the RF output cable of the exciter to the N-type input of the splitting section of the combiner. Connect five cables between the output N connectors of the splitting section of the combiner and the RF input of five suitable amplifiers. Connect five cables between the RF output of the amplifiers and the input connectors of the combining section of the coupler.

Connect the RF output cable of the exciter to the input connector (N type) of the splitter section of the combiner. Connect each of the five outputs (N type) of the splitter section with the RF input of the relative power amplifier. Connect the outputs of the amplifiers (type 7/ 8") to the inputs of the combiner joining section (type 7/ 16").

Connect the connector (type 1+5/ 8") of general RF output of the combiner to the antenna or to a dummy load able to dissipate the power. Connect, through a coaxial cable, a BNC connectors with a "Alarms/ Interlock"cable to the Interlock connector of the exciter (you see the scheme included in each station like reference). Connect the telemetry connector to the "Telemetry" connector of the exciter, if forecasted in the configuration (see the manual of station).

Connect the feeding cable to the relative MAINS connector on the rear panel.

WARNING: the feeding connector is a bare terminals, make sure that the cable is not under voltage during the connection.

WARNING: is essential that the machine comes connected correctly to ground to ensure both the safety of operation as well as the correct working of the equipment.

5.2 Operation

To perform its intended pourpose, the **HC5-10** is always used in a transmitter comprising an exciter, five RF amplifiers and one RF driver able to furnish an output power up to 250W, if the exciter doesn't give the output power demand. The **HC5-10** verifies the excitation group only for as concern the interruption of RF power and the power supply.

When the **HC5-10** comes put under voltage, verify that the two ON LED are lit. The LCD display shows a presentatio screen, and after a few seconds it will pass to the default screen, showing the values of the forward and reflected power.

Switch the exciter on (at its minimum power level) and wait for it to lock on the working frequency. When the PLL has locked, progressively increase its output power, while controlling the displays of the exciter, of the amplifiers and of the hybrid coupler. Keep increasing the exciter output overall output of the combiner reaches the desired value, that is at most the nominal power rating of the transmitting station.

At this point, it is possible for the user to verify all the working parameters of the amplifier using the management software.

Normally, the device doesn’t require any human supervision for its normal operation. If any alarm condition arise, these are automatically managed by the embedded protection system, and notified to the user with the LEDs on the panel or via messages on the LCD display.

5.2.1 General behavior with PJ2000M-C

The HC5-10 includes electronic circuits that adjust the complete system of connected amplifiers, that allows to obtain the following performances:

- Service partial operation, when any connected amplifiers are out of service also.

- Service partial operation, when only the main power phase remains active on which are connects the monophase devices also.
- Service total interruption, when the system conditions are incompatible with the functioning.

The commands that control the system HC5-10 with PJ2000M-C are:

- "ON" command, switch on the complete system.
- "OFF" command, switch off the complete system.
- "Inhibit" command, the system operation is totally suspends until to persists the signal that drives it.
- "Reset" command, effect one reset of the protections that is propagated for all the PJ2000M-C apparatuses.

Of norm the system **HC5-10** with PJ2000M-C must work with all the apparatuses setting in "Remote" position. In the case any apparatus is not in the "Remote" condition, it doesn't constitute a condition of risk of damages to any electric part of all the system.

When **HC5-10** is set in "Remote", then the complete system accepts commands only from the remote connections.

When **HC5-10** is set in "Local" and all PJ2000M-C apparatuses are in "Remote", then it’s possible to command the complete system from the **HC5-10** frontal panel.

When some apparatus was not connected in "Remote," the behavior of that apparatus is not conforming to the behavior of the others in answered to the orders operated on the system.

The operation parameters of each apparatus can be seen, in any moment, navigating through the settable menu with the keys on the frontal panel. This navigation is possible with the apparatus in "Remote" or in "Local" position.

The commands through keys on frontal panel, instead, are possible only when the apparatus is in "Local" position.

The need to effect commands only on the amplifiers apparatuses could have utility of diagnostic character, the normal operation of the apparatuses foresees that they are set in position "Remote", therefore in condition of answer to the deriving commands from the HC5-10. The set of the apparatus HC5-10, instead, could be select on the base of the option foreseen from the plan of the station. The HC5-10 could be commanded through telemetry or from the operator, in the first case must be set in "Remote," in the second case in "Local."

When the system works to regime and regularly, then the following indications are switched on :

- On HC5-10 are been switched on the two green LEDs with "ON" label. When the apparatus is adjusted up to 10KW RF output, it could be alight the yellow LED with indication "Over" too. The yellow LED, with "Local" indication, it could be alight or not alight according to the set planned from the operator.

- On each PJ2000M-C amplifier are been switched on the two green LEDs with "ON" label. When the apparatus is adjusted up to 10KW RF output, it could be alight the yellow LED with indication "Fold Back" too. The yellow LED with "Local" indication it must be not alight, it is previewed of norm that the amplifiers apparatuses are always set in "Remote."

5.2.2 General norms of di funzionamento con PJ2000M-C

The normal functioning of the **HC5-10** system with PJ2000M-C foresees that the five amplifiers apparatuses are working with equal output powers and electrical phase of their signals equalized to the input of the combiner.

Each PJ2000M-C amplifier disposes of power regulation practicable through a trimmer present on the frontal panel of the RF section. This regulation must be set for the maximum of the amplifier power adjusting the trimmer completely in clockwise sense. The equalization of the power of each amplifier comes obtained for effect of the regulator that it is present on the **HC5-10**, (trimmer labelled "Power Adjust").

The system is able to distributing a power up to 10KW RF guaranteed in output, but it has been projected in a such way for work to lower power with an acceptable electrical efficiency. Each power of output programmed requires a different excitation power.

In order to use completely the potentialities of the system, it is necessary to make reference to this small trick: the excitation of RF input must be greater of that it allows to obtain the regime RF power, this surplus of power must be such to obtain an output power increased of the quantity described in the following table.

Values table of output power surplus for every regime power value programmed.

Output Power	Output Power Surplus
10kW	400W
8kW	800W
6kW	1000W
5kW	1500W
4kW	2000W
3kW	2000W

The system could be adjusted without danger of damages also with an excitation power scarcely efficiency to obtain the power final programmed (then without surplus), in this case it is reduced the stability of the RF power output, and is obtained an electrical efficiency not optimal for lower powers than 10KW.

The electrical phase regulation of the signals of the combined amplifiers, allows to obtain a heavy reduction of the RF power wasted on the absorbers resistors. This operation gives the best results if it comes effected when the apparatuses are been adjusted to the regime power programmed from the regulator located on the frontal panel of the HC5-10 (Power Adjust).

The electrical phase of the amplifiers comes optimized in the working frequency programmed for the transmitter, but there are operational possibility that foresees that the transmitter could alternatively work on different frequencies, see systems composed of more transmitters with common reserve. In these cases the regulation of the electrical phase must be effected considering to get a compromise with working parameters acceptable for all the possible working frequencies.

This second signals setup, however, allows to get operation values of the system combined in which the wasted power stays always lower than 2% of the total. The systems optimized on a single frequency could arrive to wasted powers lower than 0.5%. Is necessary, however, adjust the phase so that the value of wasted power "Rej PWR" is inferior always than 200W. In contrary case the condition can be introduced for which the HC5-10 falls in protection with reduction of output power and it cannot return to full power for the lacked reenter of the conditions that would allow it ("Rej PWR" it; lesser than 200W).

5.2.3 Behavior of the system in function of the working parameters

The HC5-10 apparatus puts in action various operation modality according to the different conditions of work in which it is come to be situated. The HC5-10 apparatus has two groups of disposed fans on the panels and to the inside: ordinary group and emergency group.

The ordinary group must always work when the apparatus is set in "ON" position and during the short moments of post-ventilation, the emergency group enters in function when the total power on the absorbers resistances exceeds 200W and/or when the temperature of the warmer resistance exceeds 40 °C. When the emergency fans group enters in function, on the frontal panel of the HC5-10 an yellow LED, with "Fans On" label, is lit on.

For post-ventilation is understood that the ordinary fans group continues to work for around 3 minutes after the set in "OFF" position of the HC5-10. Each hour spent in “OFF" position, the HC5-10 switched on for around 3 minutes the ordinary fans group, this to remove the heat accumulated to the inside of the circuits. An electronic circuit check if the fans are regularly feeding, in case of irregularity comes generated an "Fault" alarm that interrupts the operation of the apparatus without attempts of restart. This alarm appears on the display and on a red LED positioned between the fans of the frontal panel.

An advanced measure circuit checks the power value on each of the absorbers resistances and carries out the sum. This sum is available as measured parameter on display as "Rej PWR". When the power of one of the absorbers resistances exceeds the limit of 800W, the HC5-10 reacts reducing the power of all PJ2000M-C amplifiers to maximum 1KW.

The power reduction reenters only when the total power on absorbers resistances returns under the 200W. In case that the phase regulation between the apparatuses is not optimal, with "Rej PWR" value at regime superior to 200W, the system doesn't return to full power after a phase of protection that foresees the reduction. The reduction of power comes signalled on the HC5-10 frontal panel with a yellow LED and with the "Fold Back" label.

5.2.4 Protection Circuits

The HC5-10 apparatus disposes of protection circuits that arrest temporarily and/or definitely the functioning of the whole transmitter system.

1) Protection from excessive output forward power "Fwd PWR".

It intervenes at 12.5KW, and it effect until to 8 attempts in the short period; exhausted the restoration attempts blocks the apparatus definitely, signalling the status with a "Fault" red LED placed on the frontal panel. If the total of the 8 attempts doesn't happen within the period of an hour, the counter of the interventions is reset giving back again to others 8 possibilities of restoration. During the temporary arrest on the HC5-10 frontal panel appears the yellow LED indication with "Wait" label.

2) Protection from excessive output reflected power "Ref PWR".

It intervenes at 1800W, and it effects until to 8 attempts in the short period, exhausted the restoration attempts blocks the apparatus definitely signalling the status with a "Fault" red LED placed on the frontal panel. If the total of the 8 attempts doesn't happen within the period of an hour, the counter of the interventions is reset giving back again to others 8 possibility of restoration. During the temporary arrest on the HC5-10 frontal panel appears the yellow LED indication with "Wait" label.

3) Protection from excessive excitement input power "Inp PWR".

It intervenes at 250W, and it effects until to 8 attempts in the short period, exhausted the restoration attempts blocks the apparatus definitely signalling the status with a "Fault" red LED placed on the frontal panel. If the total of the 8 attempts doesn't happen within the period of an hour, the counter of the interventions is reset giving back again to others 8 possibility of restoration. During the temporary arrest on the HC5-10 frontal panel appears the yellow LED indication with "Wait" label.

4) Protection from excessive Rejected power “Rej PWR”.

It intervenes at 1650W, and it effects until to 8 attempts in the short period, exhausted the restoration attempts blocks the apparatus definitely signalling the status with a "Fault" red LED placed on the frontal panel. If the total of the 8 attempts doesn't happen within the period of an hour, the counter of the interventions is reset giving back again to others 8 possibility of restoration. During the temporary arrest on the HC5-10 frontal panel appears the yellow LED indication with "Wait" label.

5) Protection from excessive temperature on at least one of the 5 "Temp" absorber resistances.

It intervenes at 80°C and it maintains until that the value has exceeded the threshold, when the value descends again under the limit, the functioning returns normal.

6) Protection of electric net feeding "Mains."

It intervenes when the mains voltage that feeds the apparatus HC5-10 exceeds the limits of ± 20% and the value until to that is maintained is outside from the limit interval, returns normal the operation when the value is within the limits interval.

5.2.5 Functioning Anomalies

Some operational conditions could cause a way of work of the apparatus not optimal.

Anomaly: When at least one of the PJ2000M-C amplifiers doesn't disburse the same power of the others, the power on "Rej PWR" absorbers resistances could exceed the threshold value of 200W. If during the operational period of the transmitter, a situation is verified that involves the intervention of the protection with the power reduction (es.: one of the amplifiers suspends his operation temporarily, while the others continues to work), in this case the system with HC5-10 doesn't return to the power value of RF out precedent to this event.

Remedy: Reduce the power of all the transmitter adjusting the trimmer "Power Adjust", on the HC5-10 frontal panel, until to obtain a value of "Rej PWR" inferior to 200W.

Anomaly: When the signal phase regulation of the 5 amplifiers is not optimized, the power on resistances absorbers "Rej PWR" it could exceed the value of 200W. If during the operating period of the transmitter, a situation is verified that involves the intervention of protection with power reduction (es.: one of the amplifiers it suspends its operation temporary, while the others continues to work), in this case the system with HC5-10 doesn't return to the power value of RF out precedent to this event.

Remedy: Regulate the signals phase of the of the amplifiers until to obtain a value of "Rej PWR" inferior to 200W.

When one of the amplifiers is set in "Local" position, its way of work is differentiated from the way of the other amplifiers.

When it comes controled a set of "OFF" acting on HC5-10, the amplifier in "Local" reacts with a set of "Inhibit", instead that "OFF." The situation doesn't constitute risk of damage for the whole system, only an imperfection of form.

When it comes controled a set of "Reset" of protections acting on the command of HC5-10, the amplifier in "Local" it doesn't effect his reset.

When the amplifier set in "Local" is in position "OFF," isn’t possible change its position to "ON" acting through the commands on HC5-10.

When the amplifier set in "Local" it comes commuted in "Remote", this aligns itself to the set planned from the commands operated on HC5-10.

When left one phase of the mains power, that is not what it feeds the HC5-10, the transmitter reduces its RF output power to a value that doesn't exceed the 5KW. If the power of programmed regime is inferior to the value of 5KW, doesn't happen any reduction.

When left two phases of mains power, but stays the phase that feeds the HC5-10, the transmitter reduces its RF output power to a value that doesn't exceed 1KW. If the power of programmed regime is inferior to the value of 1KW, doesn't happen any reduction.

5.2.5 Risks for the HC5-10 system with PJ2000M-C

Some operational situations are potentially harmful for some part of the system.

When the cable of interconnection of the signals of command doesn't connect all the apparatuses of the system, the amplifiers not connected doesn't react the deriving commands from the HC5-10 apparatus . This constitutes possible cause of permanent damages to the HC5-10.

If the connection of the neutral of the mains power stops in any part of the electric installation, inside or outside of the apparatus, are possible permanent **SERIOUS DAMAGES** to all the apparatuses of the system.

The apparatus HC5-10 **MUST** be connected to its driver/ exciter apparatus through a cable that allows the interrupt of the oiperation in case of intervention in protection. This connection could be of two types:

- Signal of low voltage that cuts off the power of the driver/exciter system.
- Feeding of the exciter connected to the plug of mains voltage foreseen, and available on the rear panel.

The first solution is indispensable when HC5-10 system with PJ2000M-C is connected to the telemetry, whose circuits are install on the exciter.

If at least one of the two connections doesn't come done, are possible permanent damages to the HC5-10.

The RF power cables that connect the output of each PJ2000M-C amplifier with the HC5-10 combiner must be well locked. If the contact between the connectors is not correct, leaks of energy in RF could be verified. This energy has the power to influence dangerously on the behavior of electric circuits of other apparatuses in the vicinities of the transmitter beyond that on the same transmitter. The power in game on these connections is potentially able to generate overheatings with possible fire of the cables.

WARNING: The interconnection cables between amplifiers and HC5-10 contains TEFLON, the combustion of the TEFLON generates HIGHLY TOXIC GAS for each living being.

The amplifier requires high values of current from the mains. If the cables that furnish the electric general feeding are not well locked, fires could be verified.

5.2.6 Risks for the personnel

The system HC5-10 with PJ2000M-C amplifiers could also work when one or more amplifiers have been physically removed from the system.

For the same nature of the type of combiner, the transmitter in RF power it is possible [potenzialmente] effect the removal of an apparatus maintaining in operation the transmitter in RF power, without generated signals come of overloaded that interrupts the functioning of it. Because the physical removal of an amplifier happens through the [maneggiamento] of the connectors of RF power connected to the amplifier, the operator should handle points where it is present RF energy that doesn't come interrupted from circuits of protection.

For the nature of the adopted combiner type , the removal of an apparatus is potentially possible maintaining in function the transmitter in RF power, without that come generated signals of overload that interrupts the operation. Because the physical removal of an amplifier happens through the handling of the RF power connectors connects to the amplifier, the operator would have handle points where is present RF energy that does not come interrupted from protection circuits.

In theory the values of RF power in these points are low, but for effect of the maladjustment of RF impedance that the handling could cause, the power in the connectors could go up until to very dangerous values.

These operations, therefore, are to AVOID ABSOLUTELY !

5.3 Software

This chapter describes the way the microprocessor system controls the hybrid coupler, and how the user can interact with it.

Note that the user can give commands to the device only when it's set in LOCAL mode using the switch on the front panel. Otherwise, the user will only be allowed to read the parameters, but not to change any of them.

The management of the HC5-10 is performed by a generic software used in different classes of equipment produced by R.V.R. Elettronica SpA, like the HC combiners or the RF amplifiers PJ500M-C and PJ1000M.
For this reason, some options that are related to other kinds of devices are deactivated in the software version that is installed in the HC5-10 (see for example the P.A. menu).

Note that some of the parameters that are measured and can be read may be, in some circumstances, not available. This situation mostly arises when, for physical reasons, the measured values are not significant to be used in the control software.

When the value for a parameter is not available for such reasons, it's substituted with the symbol "==".

At power on, the LCD display will show the following presentation screen, indicating the name of the device and informations regards the actual release software (SW) and hardware (HW):

After a few seconds, the main screen will be displayed, reporting the values od Forward power and Reflected power:

The management software will remain indefinitely in this default screen, until the user pushes the ESC button.

Pushing the ESC button, the user will be presented with the menu selection screen, from which the other screens can be accessed:

Pushing again the ESC button, the software goes back to the default screen.

To enter into one of the submenus, just select the corresponding name (that will be indicated by a flashing underscore) with the LEFT and RIGHT buttons, and then push ENTER.

5.3.1 Function menu (Fnc)

From this menu, the user can "switch" ON and OFF the hybrid coupler.

The result of this command is that when the HC5-10 is put in OFF mode, the inner conductor of the “Alarm” connector is shorted to ground, so that the exciter is put in stand-by mode (this will happen only if provided with an interlock connector, and if correctly connected with the hybrid coupler). At the same time, the auxiliary mains output is opened, so that if an exciter is connected to it, il will be shut off.

Whe the hybrid coupler is switched OFF, the software waits a few minutes to permit the proper cooling of the device, and then sends a signal to the relays of the blowers to turn them off too.

Each two hours, while the machine is OFF, the software enables the blowers for a while to dissipate the heat generated by the circuitry and to avoid possible malfunctions of the blowers due to long inactivity periods.

Switching ON again the hybrid coupler, the interlock circuit is opened, reenabling the power emission in the connected exciter, the auxiliary mains plug supply is powered and the blowers are restarted.

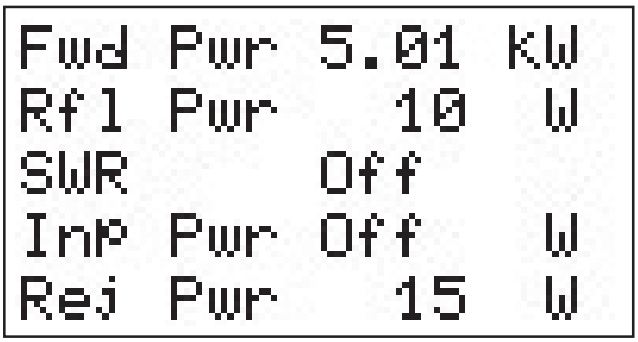
5.3.2 Power menu (Pwr)

This multi-line scrollable menu allows the user to read all the measurements related to the behaviour of the power section of the combiner:

- Forward Power (Fwd Pwr)
- Reflected Power (Rfl Pwr)
- Standing Wave Ratio (SWR) (Not active)
- Input Power (Inp Pwr)
- Reject SWR (Rej SWR)

Depending on the configuration of the machine, some of the measures could be deactivated.

The complete aspect of the screen is the following figure (please note that only two lines at a time are visible, use the UP and DOWN buttons to scroll):



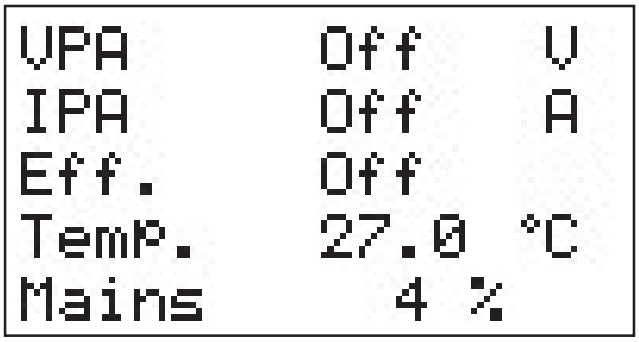
5.3.3 Power Amplifier menu (P.A.)

This multi-line scrollable menu reports to the user some internal measurement of the device:

- Voltage (VPA) - Not active
- Current (IPA) - Not active
- Efficiency - Not active
- Temperature
- Mains voltage (Mains - percentage variation with respect to the nominal voltage)

The complete aspect of the screen is the following figure (please note that only two lines at a time are visible, use the UP and DOWN buttons to scroll):

La seguente figura mostra l'aspetto completo di questa schermata (sono visibili sul display solo due righe alla volta, utilizzare i pulsanti SU' e GIU' per scorrerla):



Please note that the first three lines of this screen are not active since they are not meaningful for a hybrid coupler.

5.3.4 Threshold setting menu (Set)

As described in the introduction, the amplifier offers a maximum of three user settable alarms. For each of them, one of the working parameters is compared against a threshold value that can be be modified by the user. The results of the comparisons are available on the telemetry connector or as dry contacts on the optional external telemetry board, and can be read on the display as "O" (open, i.e. the result is false) or "C" (closed, i.e. the result is true).

Two of the settable thresholds are related to the RF emitted power (***Power Good***), while the third is connected to the amount of reflected power (***Reflected Warning***).

The thresholds are expressed as percentage of full-scale value of the relevant quantity.

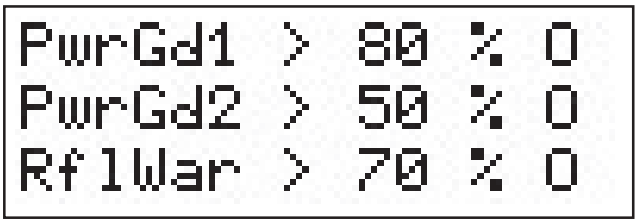
The full scale values for the HC5 are the following:

- Forward Power 10000 W
- Reflected Power 1000 W

To change the values of the thresholds, execute the following procedure:

- Select the line to modify (UP and DOWN buttons)
- Push the ENTER button
- Modify the value of the threshold (UP and DOWN buttons)
- Push the ENTER button to confirm

The following figure shows an example of configuration for this menu.



In questo esempio, le soglie degli allarmi sono:

- PwrGd 1 8000 W (80% X 10000 W)
- PwrGd2 5000 W (50% X 10000 W)
- RflWar 700 W (70% X 1000 W)

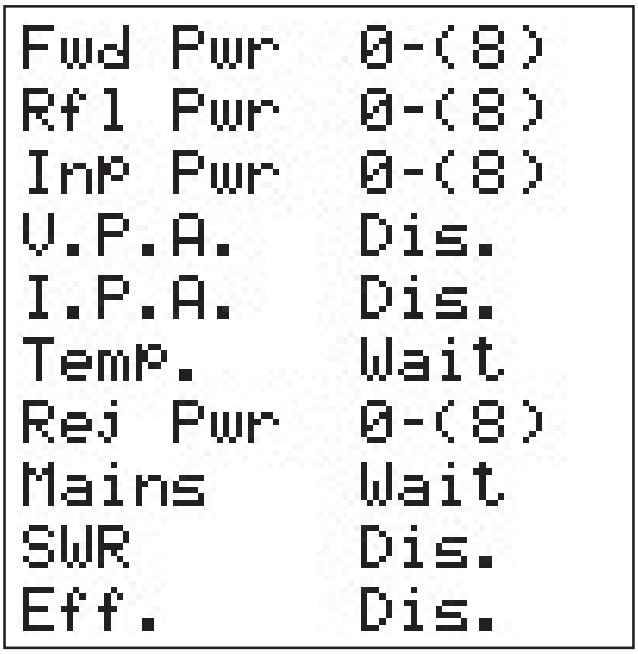
5.3.5 Alarms Menu (Alm)

This screen gives to the user information regarding the status of the protection system included in the hybrid coupler.

It is constituted by a certain number of lines, each containing the name of a variable controlled by the system and the kind of intervention that is undertaken by the system in case the parameter surpasses its limit.

The latter can be of the kind: **X - (Y)**, **Wait**, or **Dis.** (Disabled).

The aspect of this multi-line screen is the following (only two lines at a time are visible, use the UP and DOWN buttons to scroll):



The function of this menu is essentially a help for the technician to identify the causes of possible malfunctions of the transmitter.

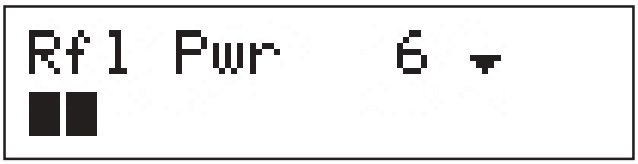
5.3.6 Various menu

Two operations can be performed using this menu:

- Setup the address of the I^2C serial bus type connection
- Setup the kind of visualitation in the default menu

The default address of I^2C communication is relevant when the coupler is connected with other RVR' devices that use this protocol. We raccomend not to change this parameter if not necessary.

The visualitation mode can be **Dig**ital (the default mode described in chapter 5.3) or **An**a**l**og:

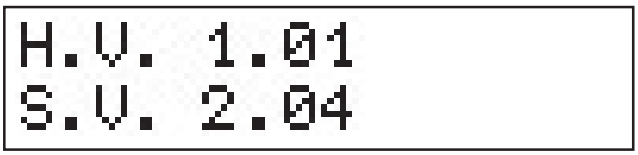


In analog mode, a little triangle indicates the reflected power level set in the threshold set menu (under RflWar), while the bar below shows the in real time level reflected power.

This last kind of visualitation is best used when the combiner output is connected to a device that has to be tuned, as a cavity.

5.3.7 Versions menu

This menu shows the hardware (H.V.) and software versions (S.V.) of the machine.



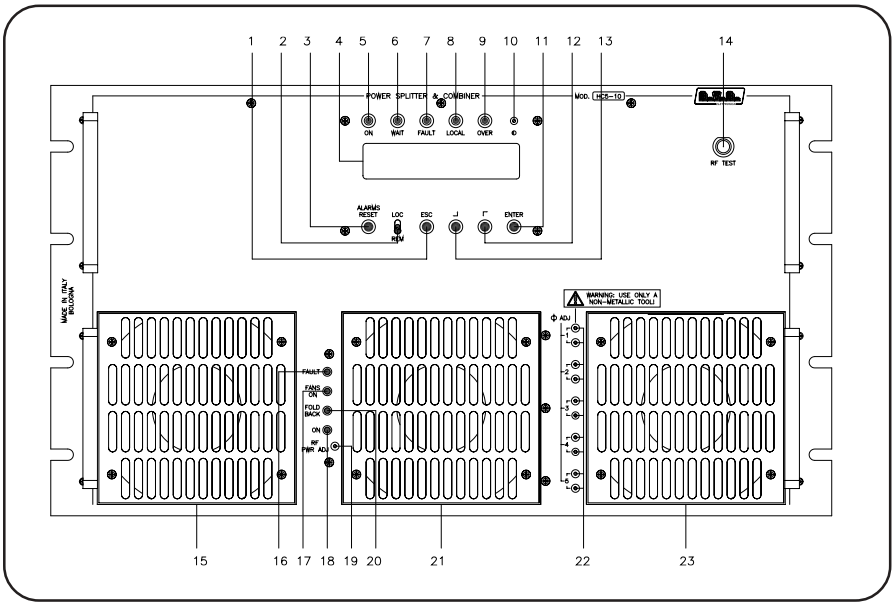
5.3.8 Protection system

The protection system implemented in hybrid coupler is based on two types of reactions, the “Foldback” and the temporary disabling.

6. Controls, Indicators and Connectors

This chapter describes the front and rear panels of the HC5-10, with a brief indication of all the different components.

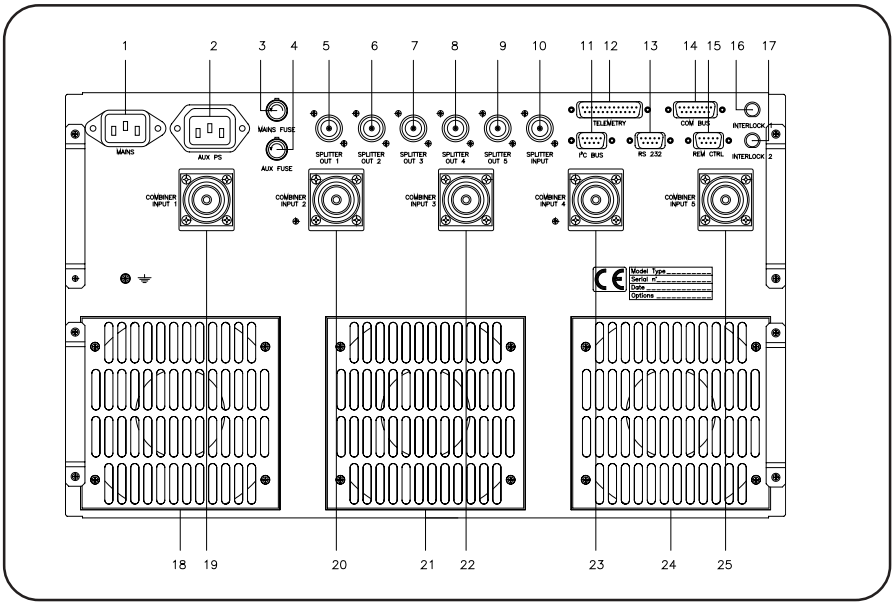
6.1 Front Panel



[1] ESC	Button to exit from a menu.
[2] LOC/REM	Switch to select the local or remote control modes.
[3] ALARM RESET	Button used to manually reset the protection system (also for the amplifiers, in the case is correctly connected).
[4] DISPLAY	LCD Display.
[5] ON	Green LED, lit when the hybrid coupler is switched on.
[6] WAIT	Yellow LED indicating that the hybrid coupler is waiting for a condition that is blocking the power output to be removed.
[7] FAULT	Red LED indicating that a fault that cannot be automatically reverted.
[8] LOCAL	Yellow LED indicating that the hybrid coupler in local control mode.
[9] OVER	Yellow LED, lit when the system have reached the maximum delivery power.
[10] BRIGHTNESS	Trimmer to regulate the brightness of the LCD display.
[11] ENTER	Button used to accept a parameter's value or to enter into a menu.
[12] RIGHT/DOWN	Button used to navigate in the menu system and to modify the changeable parameters.
[13] LEFT/UP	Button used to navigate in the menu system and to modify the changeable parameters.
[14] R.F. TEST	BNC RF monitor output. The output level is -60 dB below the power output in the band 87.5-108 MHz.
[15] AIR FILTER	Air Filter for Power Splitter and Combiner.
[16] FAULT	Red LED indicating the presence of a malfunction that could not be resolved automatically after the "RETRY" attempts set up.

[17] FANS ON	Yellow LED giallo, lit when enters in function the group of emergency fans caused from excess of temperature (exceeded the 45°C), unbalancement above the 200 W or post ventilation.
[18] ON	Green LED, lit when the hybrid coupler is sithed on.
[19] RF PWR ADJ	Trimmer for the power adjustment (turn completely in clockwise sense to have the maximum power)
[21] FOLDBACK	Yellow LED, if lit indicates the intervention of the automatic reduction of the delivered power to 1000W maximum for each amplifier.
[21] AIR FILTER	Air Filter for Power Splitter and Combiner.
[22] Φ ADJ.	Phase regulation of the input RF channels of the amplifiers. Don't USE METALLIC TOOLS FOR THE REGULATION.
[23] AIR FILTER	Air Filter for Power Splitter and Combiner.

6.2 Rear Panel



[1] MAINS VDE plug for the mains power supply.

[2] AUX PS Auxiliary VDE plug for the feeding of external devices (tipically an exciter).

[3] MAINS FUSE Protection fuse for the input of the mains power supply (10A).

[4] AUX FUSE Protection fuse for the auxiliary output AUX fuse (10A).

[5-6-7-8-9] SPLITTER OUT 1 to 5
Power Splitter Outputs (N-type connector) to drive Power Amplifiers.

[10] SPLITTER INPUT Exciter's R.F. Input connector (N-type).

[11] I^2C DB9 connector for I^2C bus networking.

[12] TELEMETRY DB25 telemetry connector.

[13] RS232 DB9 connector to link the amplifier with external devices.

[14] COM BUS DB15 connector for interfacing with the five amplifiers.

[15] REM CTRL Connettore di controllo DB9 per il collegamento dell'apparato a dispositivi esterni.

[16] INTERLOCK 1 BNC connectors to inhibit an exteral device, as an exciter. In case of fault, the inner connector is shorted to ground.

[17] INTERLOCK 2 BNC connectors to inhibit an exteral device, as an exciter. In case of fault, the inner connector is shorted to ground.

[18] HEAT SINK Heat sink.

[19-20-22-23-25] COMBINER INPUT 1 to 5
Power Combiner Inputs (7/16") from the Power Amplifiers.

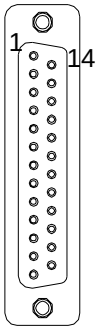
[21] HEAT SINK Heat sink.

[24] HEAT SINK Heat sink.

6.3 Connectors Description

6.3.1 Telemetry Connector

Type: DB25 Female



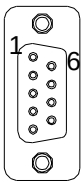
1	Rej Pwr T	Ana Out	Unbalanced power
2	Ch4 T	Disabled	
3	GND	GND	
4	Rfl Pwr T	Ana Out	Reflected power
5	OC_EXC T	Dig Out OC	Active when interlock is active
6	OC_SET4 T	Dig Out OC	Active when SET4 threshold surpassed
7	GND	GND	
8	IN_ON T	Dig In	“ON” command
9	OC_SET1 T	Dig Out OC	Active when SET1 threshold surpassed
10	OC_WAIT T	Dig Out OC	Active for “Wait” alarm presence
11	IN_RST T	Dig In	“Alarms Reset”
12	OC_OFF T	Dig Out OC	Active when OFF
13	IN_INH T	Dig In	Keep at GND potential to inhibit
14	TEMP T	Ana Out	Temperature
15	Ch_5 SDA	Disabled	
16	FWD PWR T	Ana Out	Forward power
17	OC_FAULT T	Dig Out OC	Active for “Fault” Alarm presence
18	OC_SET3 T	Dig Out OC	Active when SET3 threshold surpassed
19	INP_PWR SCL	Disabled	Input power
20	IN_OFF T	Dig In	“OFF” command
21	GND	GND	
22	OC_SET2 T	Dig Out OC	Active when SET2 threshold surpassed
23	OC_LOC T	Dig Out OC	Active when in local mode
24	VNS T	+12 Vcc	Unregulated voltage
25	OC_ON T	Dig Out OC	Active when ON

Notes:

- To give a command to the HC5 (ON, OFF, Reset), bind the relative pin to ground for approx 500 ms.
- OC output (Open Collector) are “Active” when conducing.

6.3.2 RS232 Connector

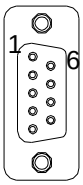
Type: DB9 Female



1	N.C.
2	TXD
3	RXD
4	Internally connected to 7 and 8
5	GND
6	N.C.
7	Internally connected to 4 and 8
8	Internally connected to 4 and 7
9	N.C.

6.3.3 I²C Connector

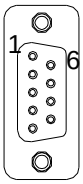
Type: DB9 Female



1	NC	
2	SDA	Serial Data
3	SCL	Serial Clock
4	NC	
5	GND	GND
6	NC	
7	NC	
8	NC	
9	NC	

6.3.4 REM CTRL connector

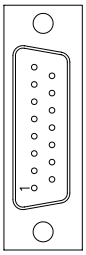
Type: DB9 Male



1	GND
2	485+
3	485-
4	IRQ
5	IN RST C (Reset Combiner Command)
6	IN ON C (On Combiner Command)
7	IN OFF C (Off Combiner Command)
8	INH PJ (Amplifier's Inhibit)
9	EXC ON (On Exciter Command)

6.3.5 Com Bus

Type: DB15 male



1	GND
2	485-
3	ON OFF C (On/Off combiner)
4	IRQ
5	PWR REG (Power Regulation)
6	NC
7	IN ON PJ (On amplifiers)
8	IN OFF PJ (Off amplifiers)
9	485+
10	GND
11	ST BY (Stand-by)
12	GND
13	GND
14	INH PJ (Inhibit amplifiers)
15	RST PJ (Reset Amplifiers)

7. Technical Specifications

7.1 Dimensional and Environmental Specifications

Cabinet Dimensions	446 mm x 262 mm x 651 mm
Panel Dimensions	483 mm x 266 mm
Weight	Approx. 30 Kg
Operating Temperature Range	-10 °C ÷ 50 °C
Humidity	95% Maximum, whithout condensation

7.2 Electrical Specifications

Characteristics of the system constituted from nr. 5 PJ2000M-C, coupled between them with HC5-10

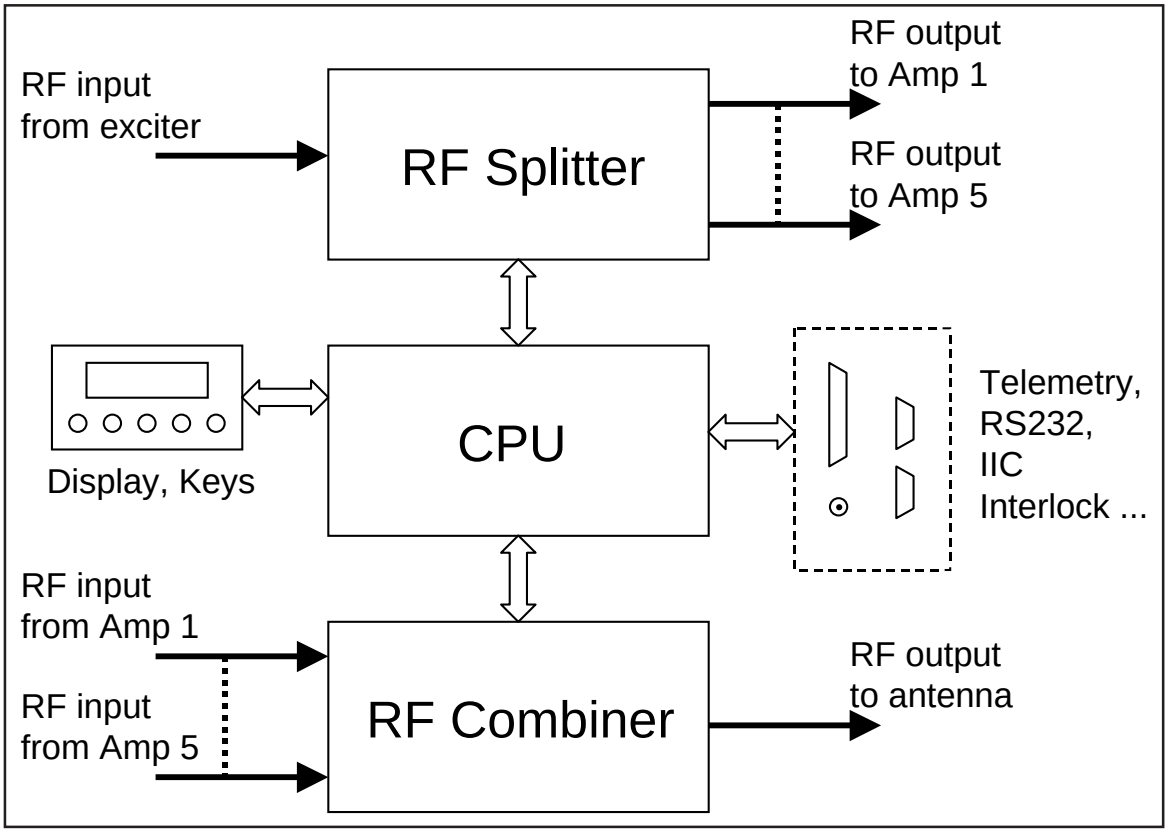
Input Power	220W max for 10kW Output
Input Power	10kW
Input/Output impedance	50 Ohm
Input connector	“N” type, female
Output connector	1”+5/8 type, female
Mains Power Supply	Three-phase Star (350V 430V) 50/60Hz , with neutral wire.
Alternative Mains Power Supply	Three-phase Triangle (190V 250V) 50/60Hz, without neutral wire.
Power consumption of PJ2000M-C with PFC	19.5kW; 10kW of RF output (including the exciter) in the worse situations
Power consumption of PJ2000M-C without PFC	26.5kVA; 10kW of RF output (including the exciter) in the worse situations

Operation limits of the combiner HC5-10

Maximum power input	250W
Maximum output forward power	12.5kW
Maximum output reflected power	1.8kW
Maximum RF power	1.65kW
RF ouput power in the case of 1 amplifier switched off and 4 amplifiers to 2.1kW	3.1kW
RF ouput power in the case of 2 amplifiers switched off and 3 amplifiers to 2.1kW	1.8kW
RF ouput power in the case of 3 amplifiers switched off and 2 amplifiers to 2.1kW	0.8kW
RF ouput power in the case of 4 amplifiers switched off and 1 amplifier to 2.1kW	0.2kW
Temperature on the cooling device of the absorber resistors	80°C

8. Electrical description

HC5 is composed of different modules wired between them with connectors, allowing for easy servicing or module substitution.



This chapter give the necessary indications to identify the modules and to understand their functionalities.

8.1 Modules Identificarion (upper view)

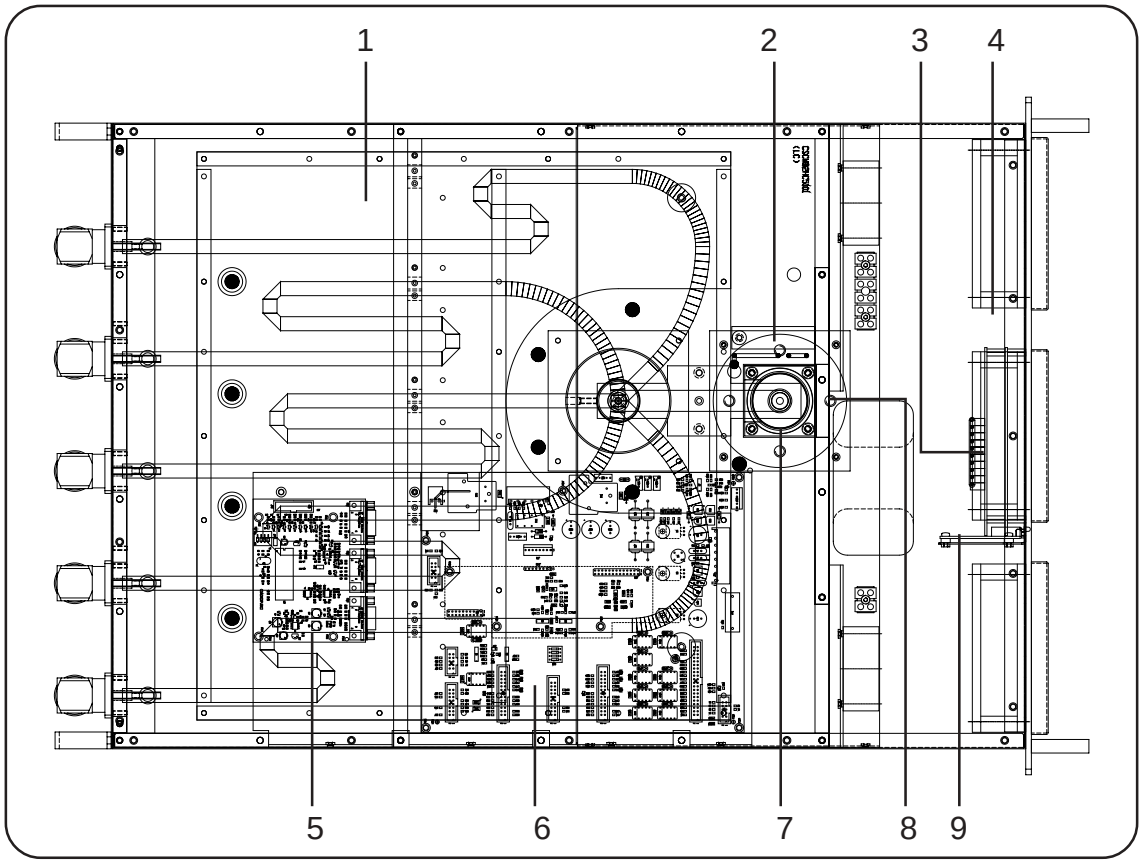


Figure below shows the upper view of the device with the indication of the different components

[1] Combiner Section

[2] Power Measure Board (not visible)

[3] CPU group

[4] Phase Regulation Board (not visible)

[5] Control card of the absorption resistances

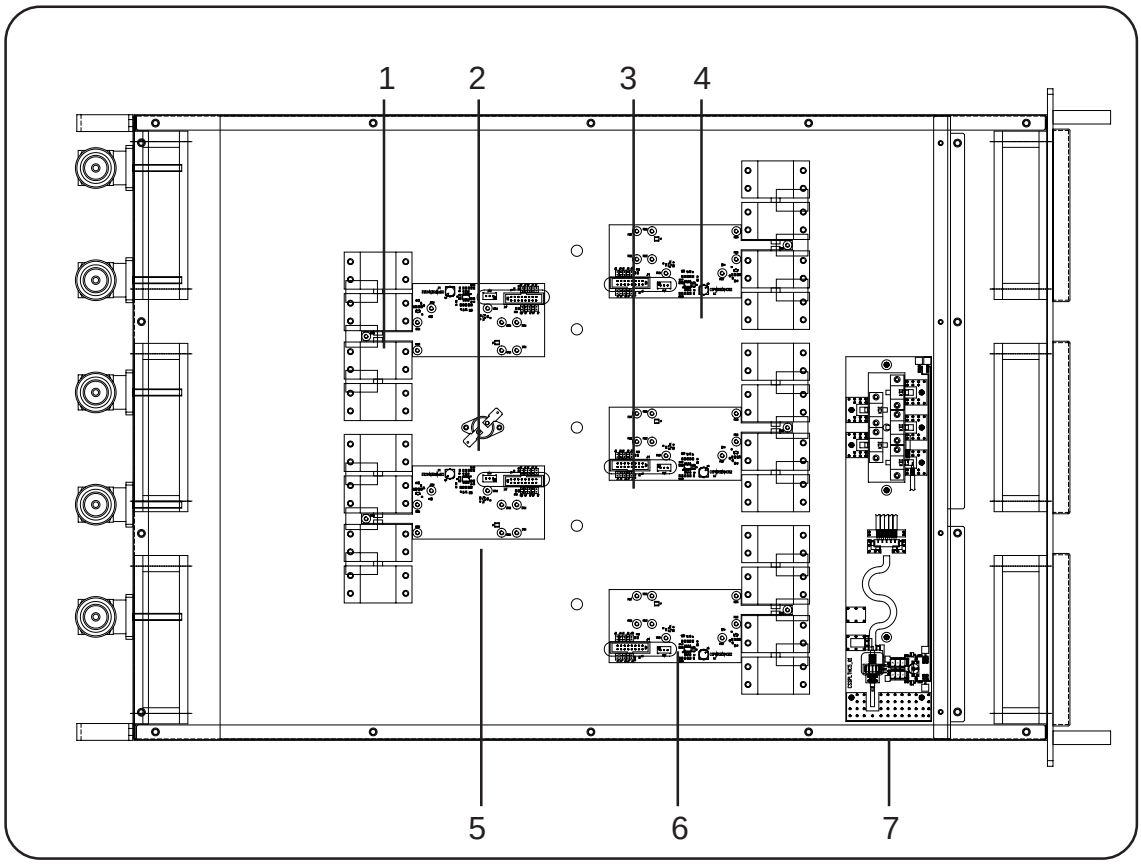
[6] Control Interface Card

[7] Power Measure Board (not visible)

[8] Combiner Output (EIA 1+5/8")

[9] LEDs Card and trimmer Power Adjust

8.2 Modules Identificarion (bottom view)



[1] Unbal Power card

[2] Temperature Sensor

[3] Unbal Power card

[4] Unbal Power card

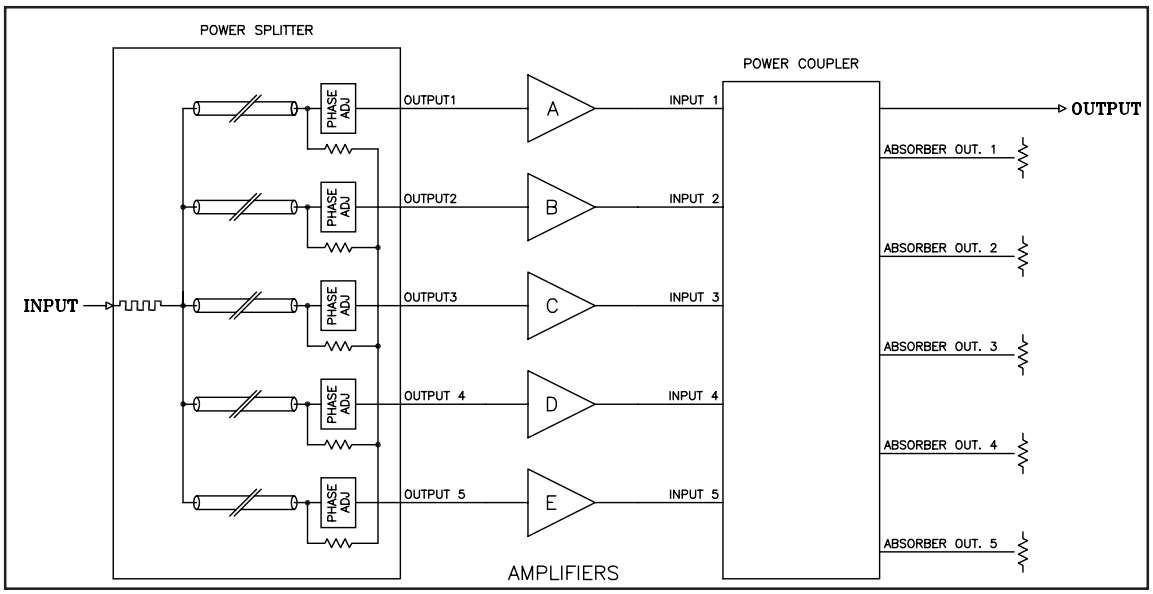
[5] Unbal Power card

[6] Unbal Power card

[7] Input Splitter Circuit

9. Theory of Operation

The figure shows the block diagrams of HC5-10. A general description of the machine's operation has been given in the precedents chapters, while in this chapter comes described the operation of the various blocks.



9.1 Operating Blocks

9.1.1 Power Supply

It in the HC5 is present only one mains transformer with different secondary winding. The secondary used are: 18-0-18V/ 0-11,5 V/ 0-17V for the feeding of the control interface card, that will go to feed all the cards that compose the machine. The rectifiers and the stabilizers are situated on the mentioned card.

9.1.2 Control Interface Card

All the measure signals of all the cards transit on this card and provides to furnish the necessary feedings to all the cards of the apparatus.

The circuit also comprises a card with a CPU mounted above that has the function of serial communication in standard 485.

Are managed some protections of the system too, like for example the power reduction of the amplifiers in case of anomalies or the intervention of the emergency fans.

9.1.3 Input Splitter Circuit

The Power Splitter circuit mounted on the rear part of the equipment in the opposite side of the input connector to the exciter and of the RF outputs to the amplifiers.

The circuit is realized with strip line plus coaxial cables.

Five resistive termination placed near to the output serves to absorb any unbalanced powers in case of faulty or performance differences of some amplifier to prevent excessive power driving on the well functioning (well loaded) outputs.

9.1.4 Phase Regulation Card

Questa scheda è montata sul lato anteriore della macchina. Sulla scheda sono presenti cinque coppie di capacità variabili che servono per compensare le fasi delle cinque uscite, provenienti dal circuito divisore, che vengono utilizzate per pilotare gli amplificatori.

9.1.5 Power combiner Card

The function of the coupler section is to add the RF power portions provided by the amplifiers and to pass it through the antenna output.

The 5-way combiner circuit is designed with strip-lines technollogies and 50 Ohm coaxial cables. The strip-line circuits are completely shielded inside the combiner cover.

9.1.6 Unbalanced Power Measurement Card

Every way of the combiner is connected to its own circuit of unbalanced power measurement card, mounted on the dissipator. The power resistances are connected to these measure circuits that serve in order to absorb unbalanced power in case of performances differences between the amplifiers of the system.

9.1.7 CPU

This subsystem is composed of three cards: the true card CPU, the analogic section CARD and the card of interconnection and filtering EMI.

The CPU implements all the software functions previously described (measurements, protections, controls, data visualizations, communications). The analogic circuitry carries out the normalizations and measures on the various parameters that the machine holds under control.

The CPU card can be interfaced to external dispositive through a dedicated telemetry connector, RS232 serial port and one IIC port.

The analogic signals provided from the hybrid coupler are available on a DB25 connector.

9.1.8 LEDs Card

On this card are present four signalling LED that indicates the general state of machine's operation.

Is present also a trimmer for the power regulation (A.G.C.), use a small screwdriver in order to modify the distributed power.

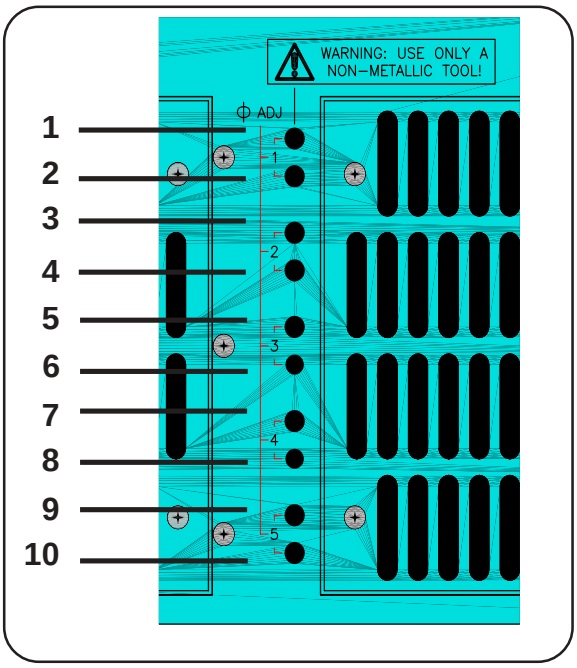
9.2 Phase Regulation between the several Amplifiers

The hybrid coupler is factory-adjusted so that the transmitter it is included in will work satisfyingly works over the whole FM band.
Cases may happen, that it is necessary to perform the RF adjustment of the HC5-10, for example if the RF interconnection cables with the amplifiers have been sustituted with other of slightly different characteristics or length, or if it is desirable to optimize the transmitter's performances on a certain frequency.

Warning: **we suggest not to perform the operations described in this chapter to personnel lacking proper instrumentation and deep knowledge of the device and its working principles.**

9.2.1 Capacitors on the splitter circuit

1) Identificare i trimmer capacitivi nel pannello frontale del HC5-10. Identify the capacitive trimmer in the frontal panel of the HC5-10.
2) Regulate all the variable capacitor in a middle position in this way :
   - Turn all the compensators in clockwise sense until to the end.
   - Turn all the compensators in counterclockwise sense for 3 turn completely.
3) Switch on the transmitter, with the exciter set up on the operating frequency and to regime power.
4) On the coupler, set up the display on the reading of **`Rej.Pwr`**.
6) Regulate the variable capacitors (1) and (2), related to the first amplifier so as to diminish **`Rej.Pwr`** measured from the coupler.



7) Regulate the variable capacitors (3) and (4), related to the second amplifier so as to diminish **Rej.Pwr** measured from the coupler.

8) Regulate the variable capacitors (5) and (6), related to the third amplifier so as to diminish **Rej.Pwr** measured from the coupler.

9) Regulate the variable capacitors (7) and (8), related to the fourth amplifier so as to diminish **Rej.Pwr** measured from the coupler.

10) Regulate the variable capacitors (9) and (10), related to the fifth amplifier so as to diminish **Rej.Pwr** measured from the coupler.

11) Repeat the points from 6 to 10 until that the system power catches up a value that cannot be diminished further.

Note:

- The described procedure is adapted to the case tou want optimize the coupler for a certain operating frequencies. When you may adjusted must itself be regulated the coupler for the operation on whole band FM, carried out the regulations before described to the frequency of 98.0 MHz, then repeated at 87.5 MHz and 108.0 MHz, until to finding the point of better compromise.
- If the compensation comes made because an amplifier is been replaced, it is generally necessary only to operate on the capacitors relative to the replaced amplifier.

10. Maintenance Procedures

This section provides general maintenance information and electrical adjustment for the HC5-10 hybrid coupler.

Warning! When the coupler is in function, inside are present **dangerous voltages**, **elevated currents**, and are presents **RF signals of strongly power**.
Don't remove any cover without switching off the system first and close all covers before restarting the system.
Ensure all primary power is disconnected from the amplifier before attempting equipment maintenance.

10.1 Routine Maintenance

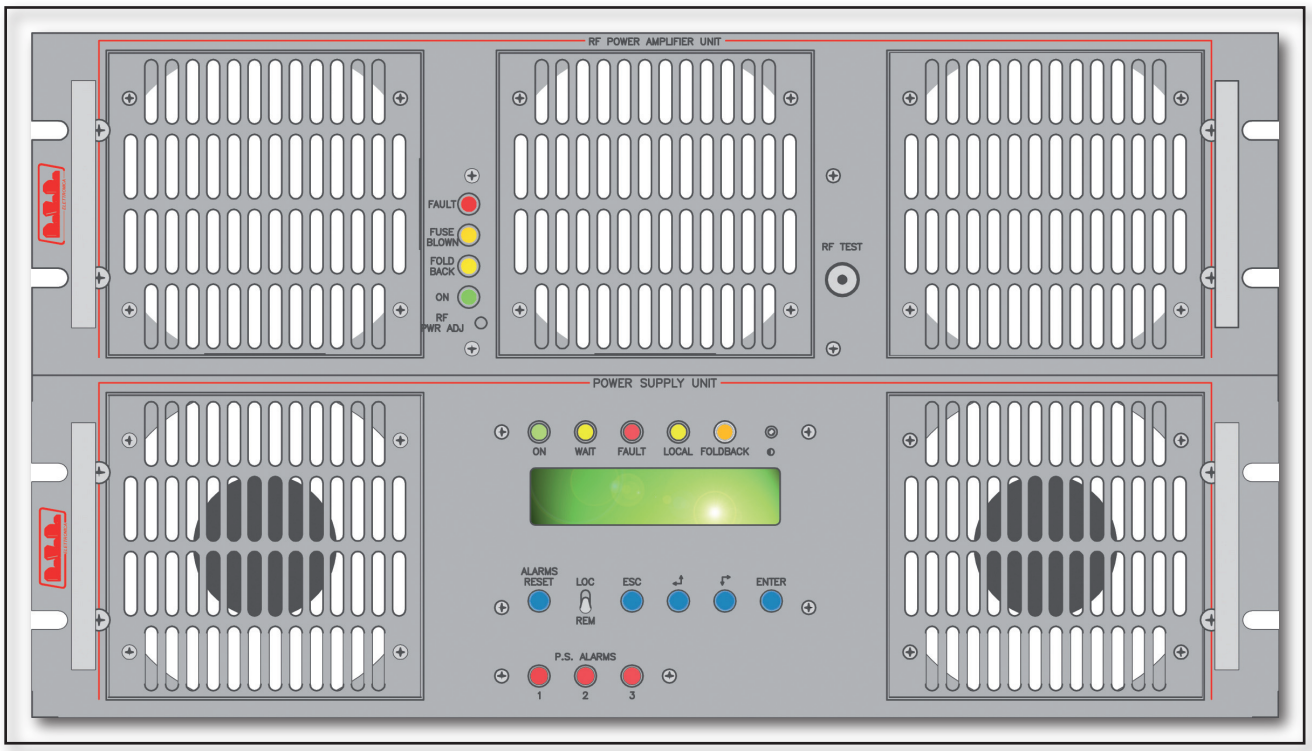
The only regular maintenance needed by HC5-10, is the periodic substitution of the blowers, and the cleaning of dust filters and any dust accumulated inside the amplifier.

The time between overhauling of the blowers depends upon several environmental factors, temperature, humidity, dust pollution etc.

It's advisable to check the unit every 6 months, and to substitute noisy blowers.

Blowers should be changed as a matter of course at least not beyond the 35000 hours of job.

PJ2000M-C, PJ2500M-C & PJ3000M-C



User Manual

Volume 1

Manufactured by R.V.R. ELETTRONICA **Italy**

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15/07/2005	1.2	Mod. PJ2500M-C integration	J. H. Berti
29/11/2006	1.3	Mod. PJ3000M-C Integration	J. H. Berti
08/10/2007	1.4	PS Input Voltage and technical Specifications Upgrade	J. H. Berti
09/01/2009	1.5	Monophase and three-phase wiring upgrade	J. H. Berti

PJ2000M-C, PJ2500M-C & PJ3000M-C - User Manual
Version 1.5

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Notification of intended purpose and limitations of product use
This product is a FM transmitter intended for FM audio broadcasting. It utilises operating frequencies not harmonised in the intended countries of use.
The user must obtain a license before using the product in intended country of use. Ensure respective country licensing requirements are complied with.
Limitations of use can apply in respect of operating freuency, transmitter power and/or channel spacing.

Declaration of Conformity
Hereby, R.V.R. Elettronica SpA, declares that this FM transmitter is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.

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IMPORTANT

The symbol of lightning inside a triangle placed on the product, evidences the operations for which is necessary gave it full attention to avoid risk of electric shocks.

The symbol of exclamation mark inside a triangle placed on the product, informs the user about the presence of instructions inside the manual that accompanies the equipment, important for the efficacy and the maintenance (repairs).

1. Preliminary Instructions

• General foreword

The equipment in object is to considering for uses, installation and maintenance from “trained” or “qualified” staff, they conscious of the risks connected to operate on electronic and electrical circuits electrical.
The “trained” definition means staff with technical knowledge about the use of the equipment and with responsibility regarding the own safety and the other not qualified staff safety place under his directed surveillance in case of works on the equipment.
The “qualified” definition means staff with instruction and experience about the use of the equipment and with responsibility regarding the own safety and the other not qualified staff safety place under his directed surveillance in case of works on the equipment.

WARNING: The machine can be equipped with an ON/OFF switch which could not remove completely voltages inside the machine. It is necessary to have disconnected the feeding cord, or to have switched off the control panel, before to execute technical operations, making sure himself that the safety connection to ground is connected.
The technical interventions that expect the equipment inspection with circuits under voltage must be carry out from trained and qualified staff in presence of a second trained person that it is ready to intervene removing voltage in case of need.

R.V.R. Elettronica SpA doesn’t assume responsibility for injury or damage resulting from improper procedures or practices by untrained/unqualified personnel in the handling of this unit.

WARNING: The equipment is not water resistant and an infiltration could seriously compromise its correct operation. In order to prevent fires or electric shocks, do not expose the equipment to rain, infiltrations or humidity.

Please observe all local codes and fire protection standards during installation and use of this unit.

WARNING: The equipment has to its inside exposed parts to risk of electric shock, always disconnect power before opening covers or removing any part of this unit.

Fissures and holes are supplied for the ventilation in order to assure a reliable efficacy of the product that for protect itself from excessive heating, these fissures do not have to be obstructed or to be covered. The fissures doesn’t be obstructed in no case. The product must not be incorporated in a rack, unless it is supplied with a suitable ventilation or that the manufacturer’s instructions are been followed.

WIRING: This equipment can irradiate radio frequency energyand if it’s not installed following the instructions contained in the manual and local regulations it could generate interferences in radio communications.

WIRING: This device has a connection to ground on the power cord and on the chassis. Check that they are correctly connected.

Operate with this device in a residential ambient can cause radio disturbs; in this case, it can be demanded to the user to take adequate measures.

Specifications and informations contained in this manual are furnished for information only, and are subject to change at any time without notice, and should not be construed as a commitment by **R.V.R. Elettronica SpA**.
The **R.V.R. Elettronica SpA** assumes no responsability or liability for any errors or inaccuracies that may appear in this manual, including the products and software described in it;and it reserves the right to modify the design and/or the technical specifications of the product and this manual without notice.

• Warning regarding the use designated and the use limitations of the product.

This product is an transmitter radio indicated for the audio broadcasting service in frequency modulation. It uses working frequencies that are not harmonized in the states of designated user.
The user of this product must obtain from the Authority for spectrum management in the state of designated user the appropriate authorization to use the radio spectrum, before putting in exercise this equipment.
The working frequency, the transmitter power, let alone other specifications of the transmission system are subject to limitation and definited in the authorization obtained.

2. Warranty

R.V.R. Electronics S.P.A. guarantees absence of manufacturing defect and the good operation for the products, within the provided terms and conditions.

Please read the terms carefully, because the purchase of the product or acceptance of order confirmation, constitutes acceptance of the terms and conditions.

For the last legal terms and conditions, please visit our web site (WWW.RVR.IT) wich may also be changed, removed or updated for any reason without prior notice.

Warranty will be void in cases of opened products, physical damage, misuse, modification, repair by unauthorised persons, carelessness and using the product for other purpose than its intended use.

In case of defect, proceed like described in the following:

1 Contact the dealer or distributor where you purchased the unit. Describe the problem and, so that a possible easy solution can be detected.

Dealers and Distributors are supplied with all the information about problems that may occur and usually they can repair the unit quicker than what the manufacturer could do. Very often installing errors are discovered by dealers.

2 If your dealer cannot help you, contact **R.V.R. Elettronica** and explain the problem. If it is decided to return the unit to the factory, **R.V.R. Elettronica** will mail you a regular authorization with all the necessary instructions to send back the goods;

3 When you receive the authorization, you can return the unit. Pack it carefully for the shipment, preferably using the original packing and seal the package perfectly. The customer always assumes the risks of loss (i.e.,

R.V.R. is never responsible for damage or loss), until the package reaches R.V.R. premises. For this reason, we suggest you to insure the goods for the whole value. Shipment must be effected C.I.F. (PREPAID) to the address specified by R.V.R.'s service manager on the authorization

DO NOT RETURN UNITS WITHOUT OUR AUTHORIZATION AS THEY WILL BE REFUSED

4 Be sure to enclose a written technical report where mention all the problems found and a copy of your original invoice establishing the starting date of the warranty.

Replacement and warranty parts may be ordered from the following address. Be sure to include the equipment model and serial number as well as part description and part number.

R.V.R. Elettronica SpA
Via del Fonditore, 2/2c
40138 BOLOGNA ITALY
Tel. +39 051 6010506

3. First Aid

The personnel employed in the installation, use and maintenance of the device, shall be familiar with theory and practice of first aid.

3.1 Treatment of electrical shocks

3.1.1 If the victim is not responsive

Follow the A-B-C's of basic life support.

- Place victim flat on his backon a hard surface.
- Open airway: lift up neck, push forehead back (**Figure 1**).

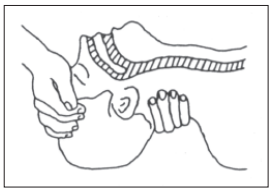


Figure 1

- clear out mouth if necessary and observe for breathing
- if not breathing, begin artificial breathing (**Figure 2**): tilt head, pinch nostrils, make airtight seal, four quick full breaths. Remember mouth to mouth resuscitation must be commenced as soon as possible.

Figure 2

- Check carotid pulse (**Figure 3**); if pulse is absent, begin artificial circulation (**Figure 4**) depressing sternum (**Figure 5**).

Figure 3

Figure 4

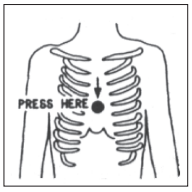


Figure 5

- In case of only one rescuer, 15 compressions alternated to two breaths.
- If there are two rescuers, the rythm shall be of one brath each 5 compressions.
- Do not interrupt the rythm of compressions when the second person is giving breath.
- Call for medical assistance as soon as possible.

3.1.2 If victim is responsive

- Keep them warm.
- Keep them as quiet as possible.
- Loosen their clothing (a reclining position is recommended).
- Call for medical help as soon as possible.

3.2 Treatment of electrical Burns

3.2.1 Extensive burned and broken skin

- Cover area with clean sheet or cloth.
- Do not break blisters, remove tissue, remove adhered particles of clothing, or apply any salve or ointment.
- Treat victim for shock as required.
- Arrange transportation to a hospital as quickly as possible.
- If arms or legs are affected keep them elevated.

If medical help will not be available within an hour and the victim is conscious and not vomiting, give him a weak solution of salt and soda: 1 level teaspoonful of salt and 1/2 level teaspoonful of baking soda to each quart of water (neither hot or cold).

Allow victim to sip slowly about 4 ounces (half a glass) over a period of 15 minutes.

Discontinue fluid if vomiting occurs.

DO NOT give alcohol.

3.2.2 Less severe burns

- Apply cool (not ice cold) compresses using the cleansed available cloth article.
- Do not break blisters, remove tissue, remove adhered particles of clothing, or apply salve or ointment.
- Apply clean dry dressing if necessary.
- Treat victim for shock as required.
- Arrange transportation to a hospital as quickly as possible.
- If arms or legs are affected keep them elevated.

4. General Description

The **PJ3000M-C** is an RF amplifier for frequency modulation sound broadcasting with a max. rated output of 3000 watts, for the **PJ2500M-C** the max. rated output is 2500W while for the **PJ2000M-C** model the max. rated output is of 2000 watts. They are a fully solid-state apparatus of modern design that use MOSFET as active components in the FM amplifying modules. This chapter briefly describes the machine's main features.

4.1 Make-Up

The **PJ3000M-C**, **PJ2500M-C** and **PJ2000M-C** amplifiers are made up of two interconnected modules pre-arranged for assembly in a 19" rack.

The two modules are as follows:

- Control and power supply module (called **PS**)
- RF amplifier module (called **RF**)

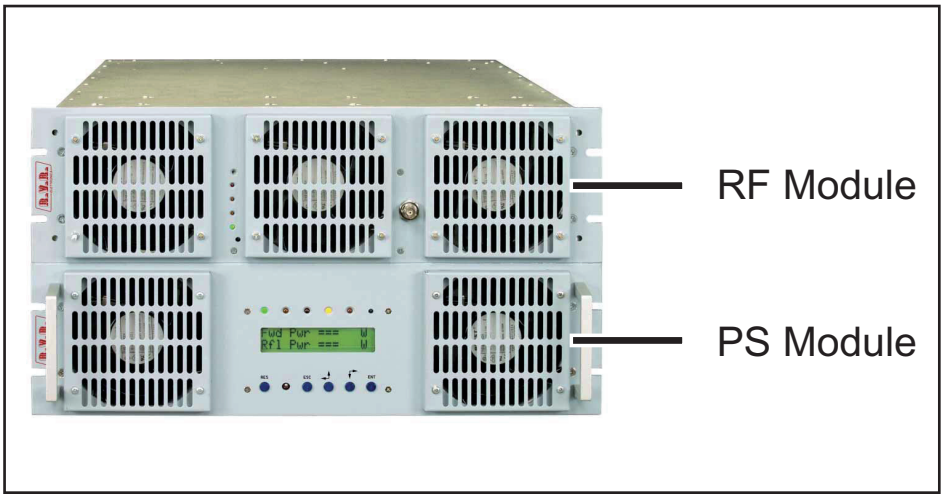


Figure 4-1: PJ3000M-C, PJ2500M-C and PJ2000M-C modules

Subdividing it into two modules not only makes it easier to handle and assemble the amplifier but also permits to perform maintenance to the two parts separately.

The **PJ3000M-C** houses six identical modules, based on the MOSFET BLF278 (2x) device, each supplies 550 watts; the **PJ2500M-C** and **PJ2000M-C** model houses eight modules, based respectively on the MOSFET SD2942 and BLF278 device, that supply 350 and 300 watts each, instead.

The amplifier is controlled by a microprocessor-based system that includes a LCD which carries out the following functions:

- Measuring and displaying amplifier work parameters
- Activating and deactivating power delivery
- Protecting the amplifier as far as potentially harmful situations are concerned such as excess supplied power, SWR, excessive pilot power or temperature

- Detecting the warning thresholds set by the user (e.g. power delivered below a specific threshold), which are made available to the user via the telemetry connector
- Communicating with external devices

The amplifier's control software is based on a menu system through which the user may navigate using the following four buttons: **ESC**, ⏎, ↓, ed **ENTER**. A fifth button is provided for resetting any triggered alarms.

The PS module of this amplifier houses three rectifier/power supply switching units that normally work in parallel mode and that provide a fair degree of redundancy to the machine. Even if one of the power supply modules breaks down the amplifier will keep working at reduced power.

A schematic view of the operating theory of amplifier is shown in the figure:

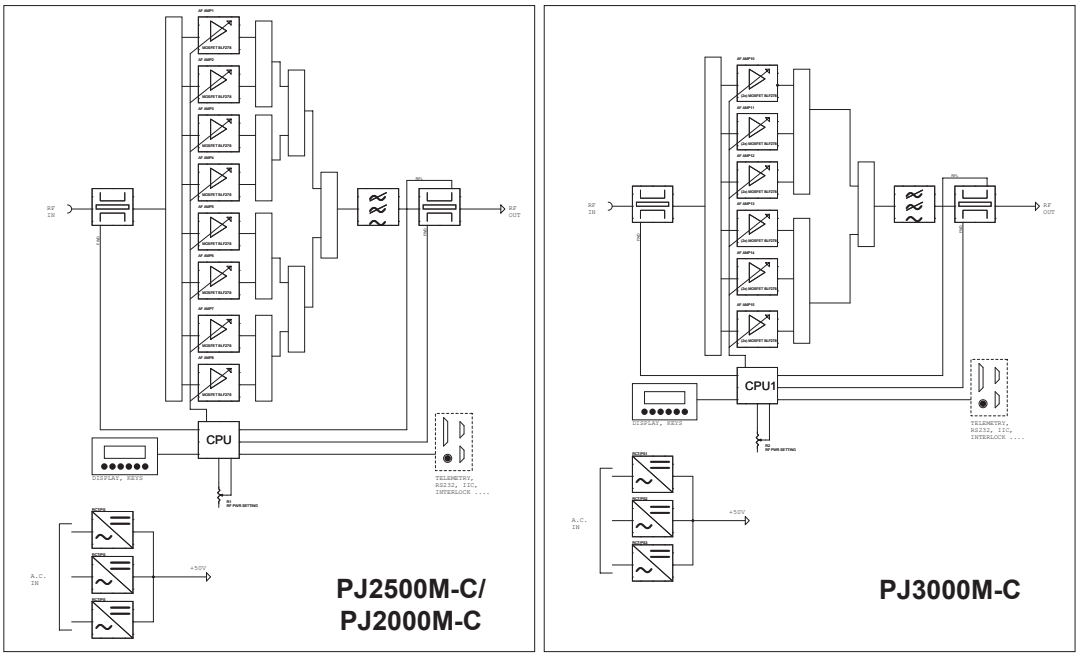


Figure 4-2: theory of operation

5. Quick installation and operating reference

The scope of this chapter is to summarize the procedures for installing the machine. If any point is not fully comprehensible, such as how to operate the machine the first time, it is advisable to read the entire manual very carefully.

In this description it is assumed that the amplifier is not supplied pre-installed in a rack inside a transmission system. In this case most of the operations outlined herein (for instance the wiring ones) are obviously not necessary.

5.1 Preparation

Unpack the amplifier and firstly check that it has not been damaged in any way during transport. Make sure that all the connectors and controls on the front and back panels are in good order.

Check the default setting of the type of power supply for this machine on the back of the **PS** module, which may be:

- single-phase 208 V, +15% -10%
- single-phase 230 V, +10% -15%
- three-phase 208 V, +15% -10%
- three-phase 230 V, +10% -15%
- three-phase 400 V, +10% -15%

Suggestion: Specify the type of power supply at order placement: the machine will be delivered to you configured according to your requirements.

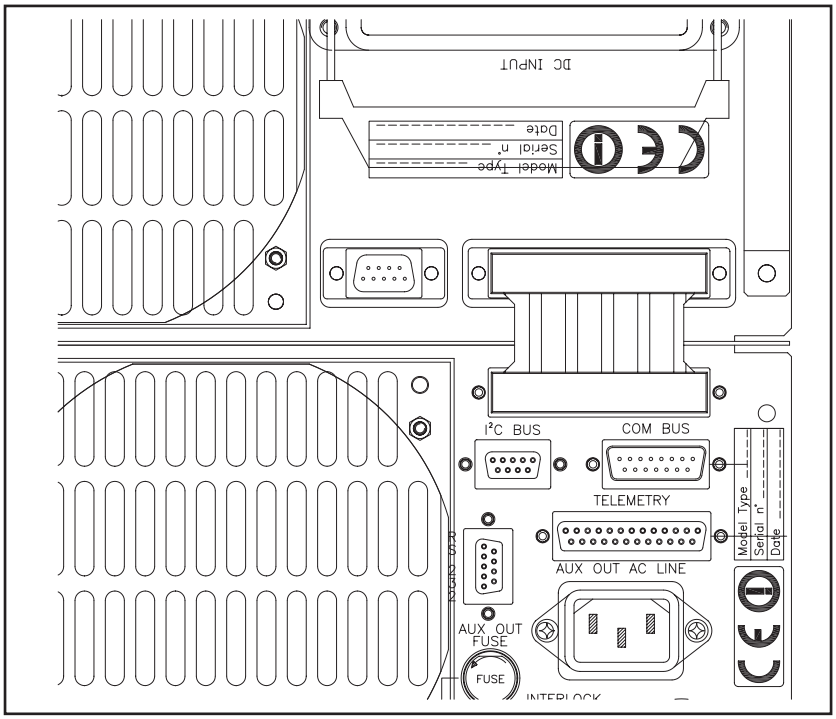
Check, if need be, that the fuses are installed, in good working order and accessible on the back panel of the PS module. The required fuse values are as follows:

	@208/230V single phase	*@208/230V three phase*	*@400V three phase*
AUX OUT FUSE *(chap. 6.2 - position [9])*	**(1x) F6,3T type 5x20**	**(1x) F6,3T type 5x20**	**(1x) F6,3T type 5x20**
SERVICE FUSE *(chap. 6.2 - position [10])*	**(1x) F6,3T type 5x20**	**(1x) F6,3T type 5x20**	**(1x) F6,3T type 5x20**
MAINS FUSE **PJ2500M-C e PJ2000M-C** *(chap. 6.2 - position [1])*	**(3x) F25T type 10x38**	**(3x) F20T type 10x38**	**(3x) F16T type 10x38**
MAINS FUSE **PJ3000M-C** *(chap. 6.2 - position [1])*	**(3x) F32T type 10x38**	**(3x) F25T type 10x38**	**(3x) F16T type 10x38**

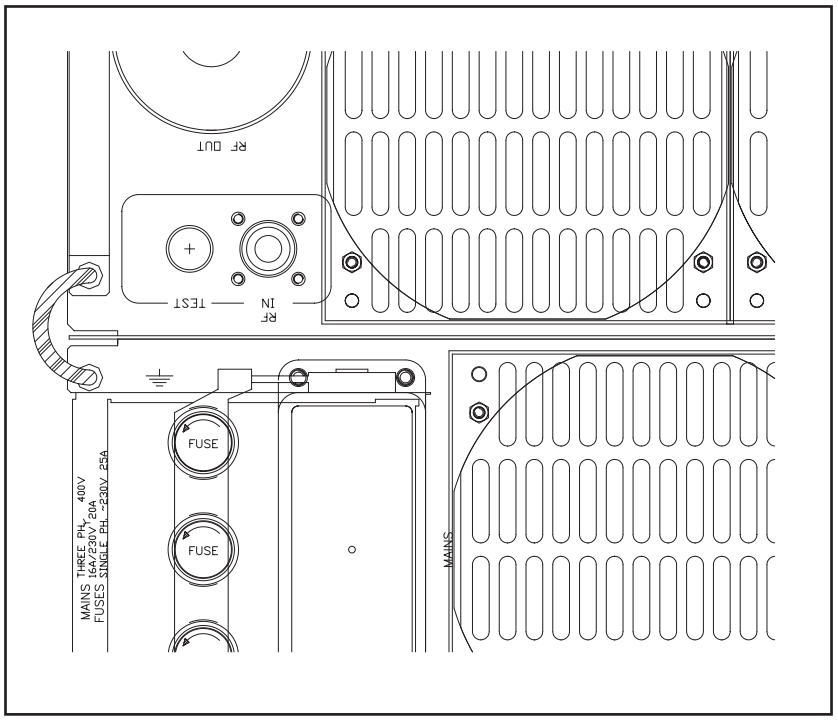
Install the amplifier in a standard rack for 19” modules.
Assemble the modules by inserting them one on top of the other.

Make the connections between the **PS** module and the **RF** module using the cables supplied with the machine:

- Data connection by means of cable with DB37 connectors (PS-RF Interconnection)



- Ground connection between each module chassis



- Power supply connection by means of cable coming out of the **PS** module ending with the ILME CXM 4/2 type of socket (DC Output)

Figure 5-1 *Example of installation in a rack*

Connect the output of a suitable type of FM exciter (e.g. the PTXLCD of R.V.R. Elettronica) to the RF input (**RF** module) using a cable fitted with N type connectors. The exciter should be set to minimum output power and OFF.

Connect the amplifier's INTERLOCK connector (on the back of the PS module) to the exciter's Interlock input, if available (it is available in all RVR Elettronica exciters) using a twin wire with BNC connectors.

Note: the amplifier's INTERLOCK connector is an output. The operating logic is as follows: the internal conductor floats when the amplifier works correctly, on the contrary power is delivered and the internal conductor is closed to ground to halt the exciter.

Connect the RF output to the antenna cable or to a dummy load capable of dissipating the power generated by the amplifier.

An ILME model CXF4/2 multipole socket is supplied with the amplifier to power the machine. The socket must be connected to the multipole cable that will be wired to the mains switchboard.

Danger: to avoid any risk of shock make ABSOLUTELY sure that the power supply cable is NOT powered when the multipole socket is connected to the cable itself.

Connect the multipole socket to the power supply cable as described below and refer to figure 5-2:
Three-phase power supply:

- G Ground
- 1 Neutral
- 2 R Phase
- 3 S Phase
- 4 T Phase
- 11,12 Not connected

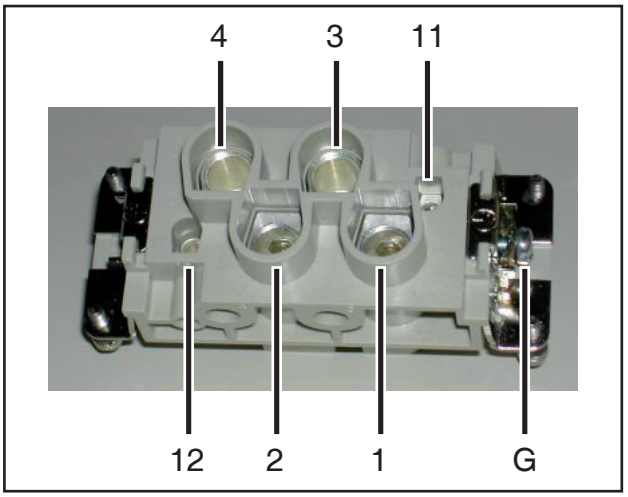


Figure 5-2: *View of the mains multipole socket - terminals side (internal)*

Single-phase power supply:

- G Ground
- 1 Not connected
- 2 Phase
- 3 Neutral
- 4 Not connected
- 11,12 Not connected

Danger: avoid the **risk of damaging the machine** by grounding it correctly. As such, connect the ground conductor of the power supply cable to the specific terminal in the multipole socket and check the efficiency of your own grounding system.

Check that the multi-turn RF PWR ADJ trimmer on the RF module is turned clockwise completely (as factory setting). As such, the action of the Automatic Gain Control (AGC) is disabled.

5.2 Operation

After having plugged in the power supply socket at the back of the machine, power on the amplifier via the switchboard. The ON LEDs on both modules will turn on and the forced cooling fans will start running. The LCD shows the first introductory screenful and then switches to a screenful that indicates the forward and reflected power values.

Turn on the exciter (at lowest power) and wait until it locks to the work frequency. Once locked, increase power gradually and check the amplifier's display. Increase the exciter's power until the amplifier's output attains the desired value, max. 3000 watts for **PJ3000M-C** model, or 2500 watts for **PJ2500M-C** model, or 2000 watts for **PJ2000M-C** model (keep in mind that due to the measurement digitalization

effect it might not be possible to obtain a reading of exactly 3 kW, 2.5 kW or 2 kW, but a lightly higher or lower value which is perfectly normal).

NB **Note:** now the amplifier is adjusted to its rated output, but **the AGC function is not checking the delivered power**. Any changes in the driving power or in the environmental conditions could cause slight output power changes.

In order to operate the AGC, increase the driving power by about 10% as compared to the value required to obtain the amplifier's desired output level (the amplifier's output power will increase but this is not a hazard for the amplifier thanks to its built-in protection system).
Now turn the multi-turn RF PWR ADJ trimmer on the RF module counterclockwise and check on the display that the power delivered by the amplifier decreases until the desired value is attained.

Should you need to use the amplifier at a power level lower than the rated one, proceed as follows:

- If back-off is temporary (for instance to run a test), reduce the output power level of the exciter until power delivered from the amplifier reaches the desired value.
- If back-off is permanent (to set the station's power at a level lower than the maximum rated output), first disable the AGC by turning the RF PWR ADJ trimmer clockwise all the way. Then reduce driving power until you attain an amplifier output power value equivalent to the desired level plus approximately 10 %. Finally turn the trimmer counterclockwise until the delivered power decreases to the required level.

Now all of the machine's operating parameters may be checked via the software control system.

As a rule, the machine does not need to be manned to work. If any alarm conditions occur, they will be managed automatically by the protection system or notified to the user by means of LEDs on the panel and messages on the display.

5.3 Software

This chapter describes the ways in which the microprocessor controls the amplifier and how the user may interact with the software.

Questo capitolo descrive le modalità con cui il microprocessore controlla l'amplificatore, e come l'utente può interagire con il software.

The figure in the follow shows the overall software user interface diagram.

NB **Note:** the user may issue commands to the equipment only when in LOCAL mode by means of the selector. Otherwise the user may only read the parameters and not change them.

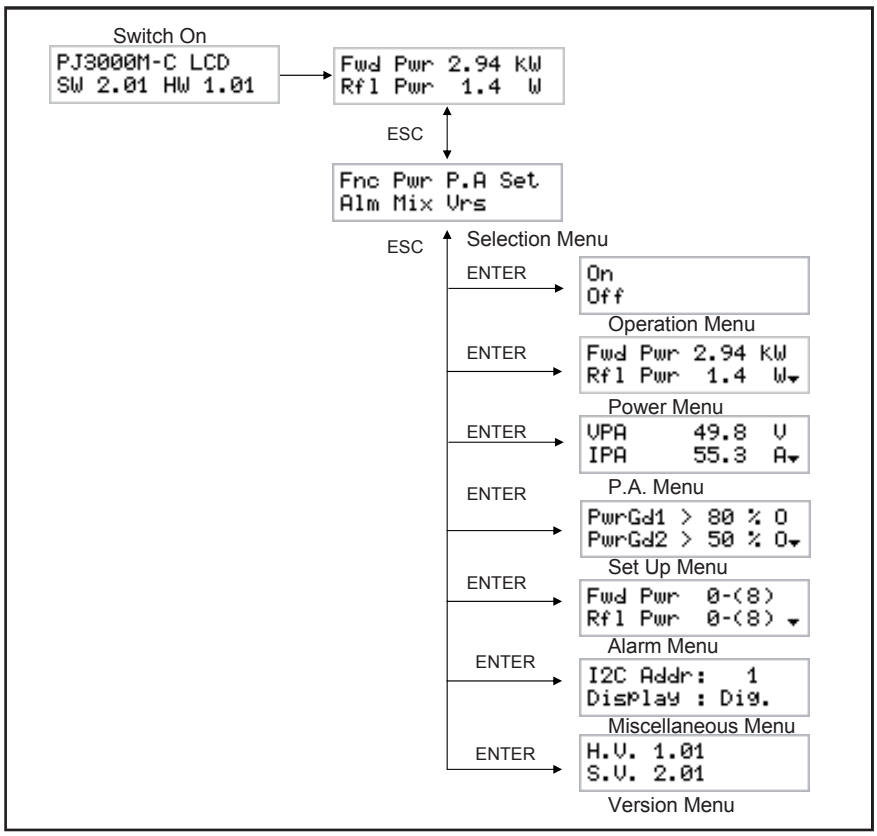


Figura: *Flow diagram of the software*

When turned on, the LCD shows the introductory screenful with the equipment's software and hardware versions.

```
PJ3000M-C LCD
SW 2.01 HW 1.01
```

A few seconds later the main screenful is displayed indicating the forward and reflected power values:

```
Fwd Pwr 2.94 kW
Rfl Pwr  1.4  W
```

Press the ESC key to view the selection screenful from which to access all the menus:

```
Fnc Pwr P.A Set
Alm Mix Vrs
```

To access one of the submenus select its name (which is underlined by a blinking cursor) using the RIGHT or LEFT keys and then press the ENTER key.

Take note that certain parameters, which are measured and shown to the user, might not be available in a few cases. This occurs when, for physical reasons, the measured vales are not significant for control software internal use.

When the value of a parameter is not available for the aforesaid reason, symbol "**==**" appears on the display in lieu of the value.

5.3.1 Operating Menu (Fnc)

Turn the power amplifier ON or OFF via this menu.

When the amplifier is turned OFF, the internal conductor of the INTERLOCK connector is set to ground so as to force the connected exciter to a stand-by condition (this takes place only if the exciter features the interlock option, like those produced by RVR, and if the associated connector is connected to the amplifier).

When the amplifier is turned OFF the software program waits a few seconds for the machine to cool down and then the fans turn OFF.

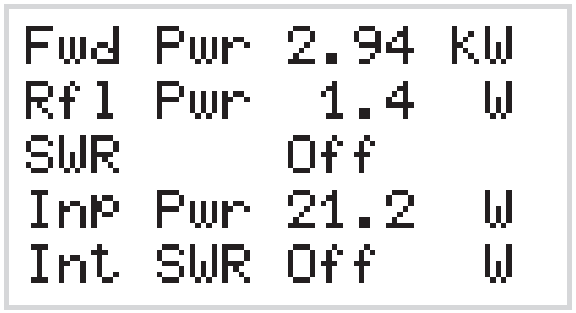
5.3.2 Power Menu (Pwr)

This screen, made up of several lines that may be scrolled through using the UP and DOWN keys, displays all the measurements associated with the behaviour of the amplifier's power section:

- Forward Power (Fwd Pwr)
- Reflected Power (Rfl Pwr)
- SWR (Standing Wave Ratio)
- Input Power (Inp Pwr)
- Internal SWR (Int SWR)

Depending on the machine's configuration a few measurements might be disabled.

The figure below shows the complete aspect of this screen (only two lines can be seen at a time, use the UP and DOWN keys to scroll through it):

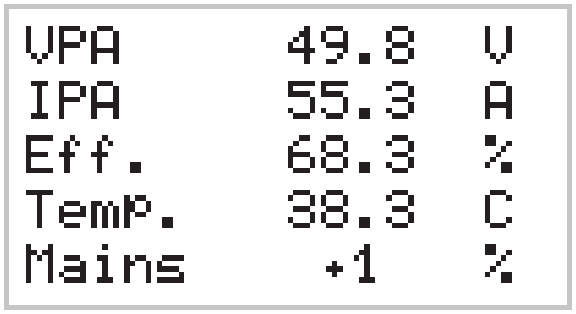


5.3.3 Power Amplifier Menu (P.A.)

This screen, consisting of several lines that may be scrolled through by using the UP and DOWN keys, displays all the measurements associated with the RF amplifier of the equipment:

- Voltage (VPA)
- Current (IPA)
- Efficiency
- Temperature
- Power Supply Voltage (Mains - percentage variation as compared to the nominal voltage)

The figure below shows the complete aspect of this screenful (only two lines can be seen at a time, use the UP and DOWN keys to scroll through it):



5.3.4 Warning threshold setting menu

As mentioned in the introduction the amplifier offers three settable warning thresholds. Each one is compared with the level of one of the machine's operating parameters. The results of the comparison are available on the telemetry connector, on the contacts of the optional external telemetry card and may be read on the display as "O" (open, i.e. false result) or "C" (closed, i.e. real result).

Two of the settable thresholds (***Power Good***) refer to the emitted power level whereas the reflected power quantity (***Reflected Warning***) is checked for the third one.

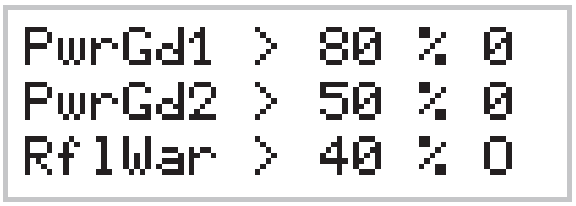
The limit voltages of the quantities monitored by the warning thresholds for are the follows:

- Forward Power 3000 W (mod. **PJ3000M-C**)
- Forward Power 2500 W (mod. **PJ2500M-C**)
- Forward Power 2000 W (mod. **PJ2000M-C**)
- Reflected Power 200 W

Proceed as follows to change the values of the warning thresholds:

- Select the line to be changed (with the UP and DOWN keys)
- Press the ENTER key
- Change the threshold value (UP and DOWN keys)
- Press ENTER to confirm

The figure below shows a configuration example of this menu.



In this example the alarm thresholds are as follows:

- PwrGd1 2400 W (80% x 3000 W x mod. **PJ3000M-C**)
  2000 W (80% x 2500 W x mod. **PJ2500M-C**)
  1600 W (80% x 2000 W x mod. **PJ2000M-C**)
- PwtGd2 1500 W (50% x 3000 W x mod. **PJ3000M-C**)
  1250 W (50% x 2500 W x mod. **PJ2500M-C**)
  1000 W (50% x 2000 W x mod. **PJ2000M-C**)
- RflWar 80 W (40% x 200 W)

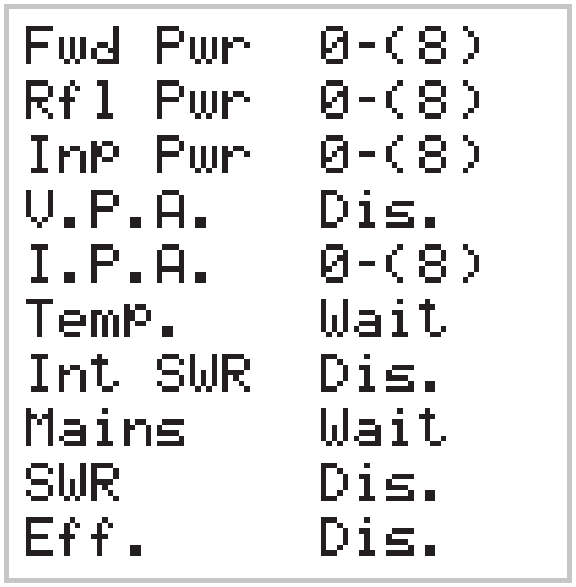
5.3.5 Alarm Menu

This menu provides information about the status of the amplifier's built-in protection system.

It consists of a certain number of lines each of which contains the name of the variable controlled by the protection system and the type of intervention carried out by the system.

Said intervention may be as follows: **X - (Y)**, **Wait**, or **Dis**. (Disabled).

The aspect of this menu is as follows (only two lines can be seen at a time, use the UP and DOWN keys to scroll through it):



The task of this menu is essentially to help the technician in identifying the possible causes of any malfunction.

5.3.6 Miscellaneous Menu

In this menu the user may:

- set the address in the serial bus connection, type I^2C
- set the main menu display mode

The network address I^2C is very important when the amplifier is connected in an RVR transmission system that envisages the use of this protocol. Do not change it for any reason whatsoever.

The main menu may be displayed either in **Dig**ital mode (this is the standard mode) or **Ana**l**o**g mode:

In the analog display mode a small triangle indicates the reflected power level set in the Alarm Threshold Setting Menu (RflWar), whereas the bar at the bottom shows the instant reflected power level.

This type of display might be useful when a device to be tuned is connected to the amplifier's output such as a cavity.

5.3.7 Version Menu

This screenful shows the hardware version (H.V.) and the software version (S.V.) of the equipment.

5.4 Protection System

The protection system implemented inside the amplifier is based on two types of intervention.

The first reaction is called “Foldback” and consists in decreasing the voltage in the power amplifier when the forward or reflected power exceeds the proportional limit voltage value. As such, the amplifier’s gain is reduced and the overall result is an action that opposes the increase of the forward or reflected power. The yellow LED on the front panel indicates the tripping of the foldback circuit.

The second type of reaction consists in turning OFF the equipment’s amplifying section when a specific variable exceeds a set value.

Depending on the type of event occurred, and after the amplifier has been turned OFF, it will be reactivated after a set length of time or only after the sharing, which caused the locking, has been cleared. In the alarm menu the first type of configuration is indicated by **X - (Y)**, whereas the second one is indicated by **Wait**. The third possibility is that the system does not trigger the protection conforming to a specific parameter: this is indicated by **Dis**. (Disabled).

While the amplifier is OFF temporarily owing to an alarm, the yellow WAIT LED lights up and the reason the protection was triggered is shown on the display.

When the protection system trips due to a “cyclic” type parameter, a counter begins counting up (the X value in the alarm menu). If the counter reaches the max admissible cycle value (Y), the amplifier turns OFF definitely and the red “FAULT” LED lights up on the front panel.

The user may press the ALARMS RESET key to interact with the protection system. The effect differs depending on the machine’s status when the key is pressed:

- If the equipment is off, waiting for the cycle time to be reached, or if it is definitively off in FAULT state, press the ALARMS RESET button to immediately turn the amplifier ON and reset the alarm counters.
- SIf the system is transmitting but alarms were triggered earlier causing certain counters not to be at “0”, pressing the key will have no effect unless it is pressed while inside the alarm menu. As such, the system will be sure that the user takes note of the alarms that were triggered before resetting them.

The system resets the alarm counters automatically after thirty minutes of operation, i.e. the user need not do anything, if the amplifier does not trigger any alarms or after the machine the machine has been turned OFF and then back ON.

5.4.1 RF module auxiliary protection

The amplifier's RF module contains a second microcontroller that manages local measurements and carries out auxiliary protection functions of the machine together with the main protection system. This microcontroller card indicates its interventions via the LEDs of the RF module.

A delivered power automatic back-off mechanism is envisaged for excess temperature, SWR or current absorbed by a MOSFET module. The yellow FOLDBACK LED indicates this case.

A FAULT signal is triggered (red LED) when a fault occurs that stops the power amplifier. This situation is signaled to the machine's main microcontroller as well and triggers a lock situation (FAULT).

The LED FUSE BLOWN indicates that one of the fuses that protects the power supply of the MOSFET modules has blown. In this case the machine keeps running as usual (obviously without the contribution of the module) even if it is advisable to single out and clear the cause for the malfunction and replace the fuse as soon as possible to fully restore the machine's working efficiency.

NB **Note:** Il pulsante RESET sul modulo PS resetta anche le protezioni ausiliarie del modulo RF.

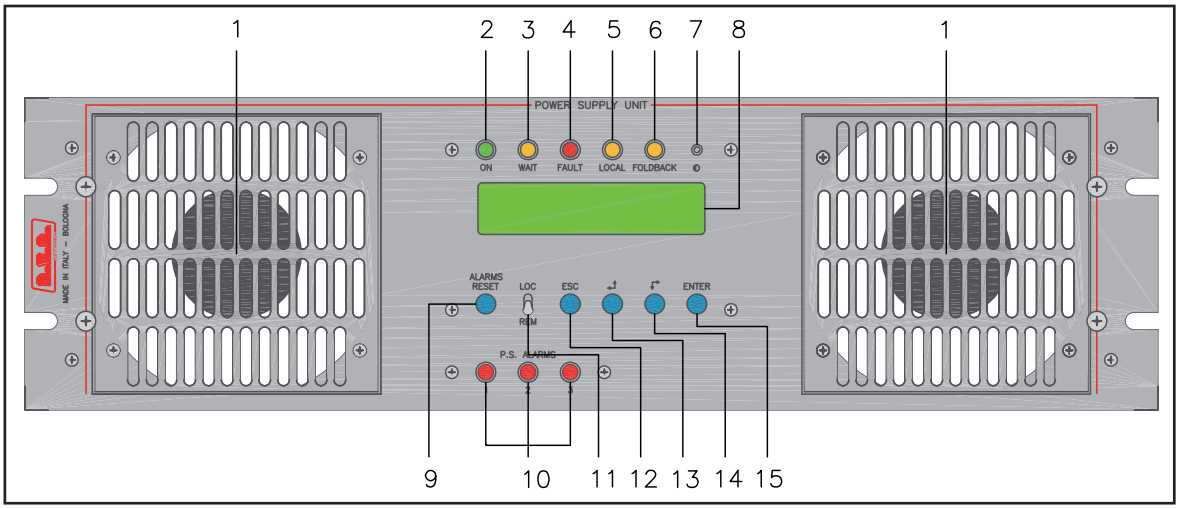
5.4.2 Power Supply Units

Three power supply units, which work in parallel mode, power the machine. Should one of the power supply units malfunction, the machine automatically reduces the delivered power down to a value compatible with the current deliverable from the surviving power supply. This situation is indicated by the "P.S. ALARMS" LEDs on the front panel of the PS module.

6 External Description

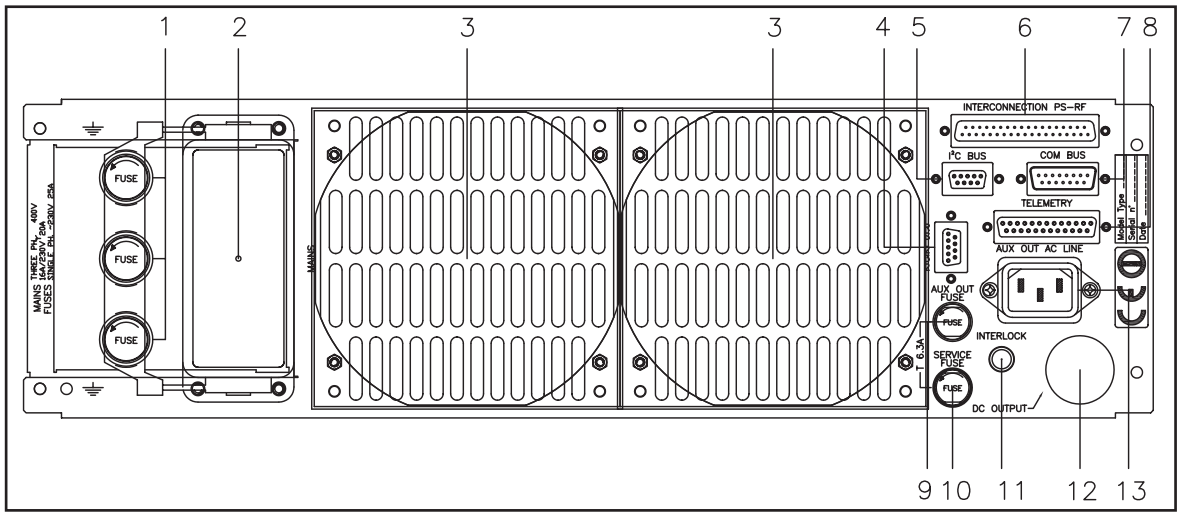
This chapter describes the elements presents on the panels of the **PJ3000M-C**, **PJ2500M-C** and **PJ2000M-C**.

6.1 PS Module Frontal Panel



[1]	AIR FLOW	Grill for the ventilation flow passage
[2]	ON	Green LED indicating the amplifier is switched on
[3]	WAIT	Yellow LED indicating the amplifier is waiting for a condition that is blocking the power output to be removed
[4]	FAULT	Red LED indicating that a fault that cannot be automatically reverted
[5]	LOCAL	Yellow LED, indicating that the amplifier is in local control mode
[6]	FOLDBACK	Yellow LED, indicating that the foldback function is active (automatic reduction of the distributed power)
[7]	CONTRAST	Trimmer to regulate the contrast of the LCD display
[8]	DISPLAY	LCD display
[9]	ALARM RESET	Button used to manually reset the protection system
[10]	P.S. ALARMS	Yellow LEDs, indicating the presence of a anomaly on one or more power supply boards
[11]	LOC/REM	Switch to select the local or remote control modes
[12]	ESC	Button used to exit from a menu
[13]	SINISTRA/SU'	Button used to navigate in the menu system and to modify the changeable parameters
[14]	DESTRA/GIU'	Button used to navigate in the menu system and to modify the changeable parameters
[15]	ENTER	Button used to accept a parameter's value or to enter into a menu

6.2 PS module Rear Panel



[1]	MAINS FUSE	Protection fuses of the power supplies 1,2 and 3
[2]	MAINS CONNECTOR	Plug for mains power supply
[3]	AIR FLOW	Grill for the ventilation flow passage
[4]	RS232	DB9 connector to interface with external devices or factory programming
[5]	I^2C BUS	DB9 connector for I^2C bus networking
[6]	INTERCONNECTION PS-RF	DB37 connector for interfacement with RF part
[7]	COM BUS	DB15 connector for interfacement with other equipment
[8]	TELEMETRY	DB25 telemetry connector
[9]	AUX OUT FUSE	Protection fuse of the auxiliary plug
[10]	SERVICE FUSE	Protection fuse for the service section
[11]	INTERLOCK	BNC connectors to inhibit an external device, as an exciter. In case of fault, the inner connector is shorted to ground
[12]	DC OUTPUT	Presa per l'alimentazione della parte RF
[13]	AUX OUT AC LINE	Auxiliary VDE plug to supply external devices (typically an exciter)

6.3 Connector Description

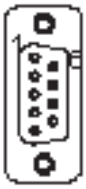
6.3.1 Telemetry Connector

Type: DB25 Female

1	Internal SWR	3,9V x 1/2W
2	Tensione dell' amplificatore di potenza RF	3,9V x 50V
3	GND	GND
4	Reflected Power	4.3V x 200W
5	Interlock	
6	Set 4	
7	GND	GND
8	"On" Command	
9	Set 1	
10	WAIT	
11	Reset alarm	
12	OFF	
13	Interlock	
14	Temperature	3.9V x 100°
15	RF power amplifier current	3.9V x 75A
16	Forward Power	4.3V x F.S.
17	FAULT	
18	Set 3	
19	Input power	3.9V x 50W
20	"OFF" Command	
21	GND	GND
22	Set 2	
23	LOC	
24	+Vcc	
25	ON	

6.3.2 RS 232

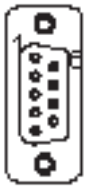
Type: DB9 female



1	NC
2	TX_D
3	RX_D
4	Internally connected with 6
5	GND
6	Internally connected with 4
7	Internally connected with 8
8	Internally connected with 7
9	NC

6.3.3 I²C Connector

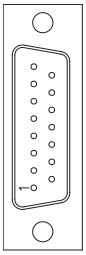
Type: DB9 Female



1	NC	
2	SDA	Serial Data
3	SCL	Serial Clock
4	NC	
5	GND	GND
6	NC	
7	NC	
8	NC	
9	NC	

6.3.4 Com Bus

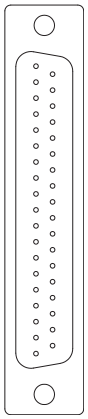
Type: DB15 male



1	GND
2	485+
3	485-
4	GND
5	ON OFF C
6	INP PWR
7	ST BY
8	IRQ
9	GND
10	PWR REG
11	GND
12	NC
13	NC
14	NC
15	NC

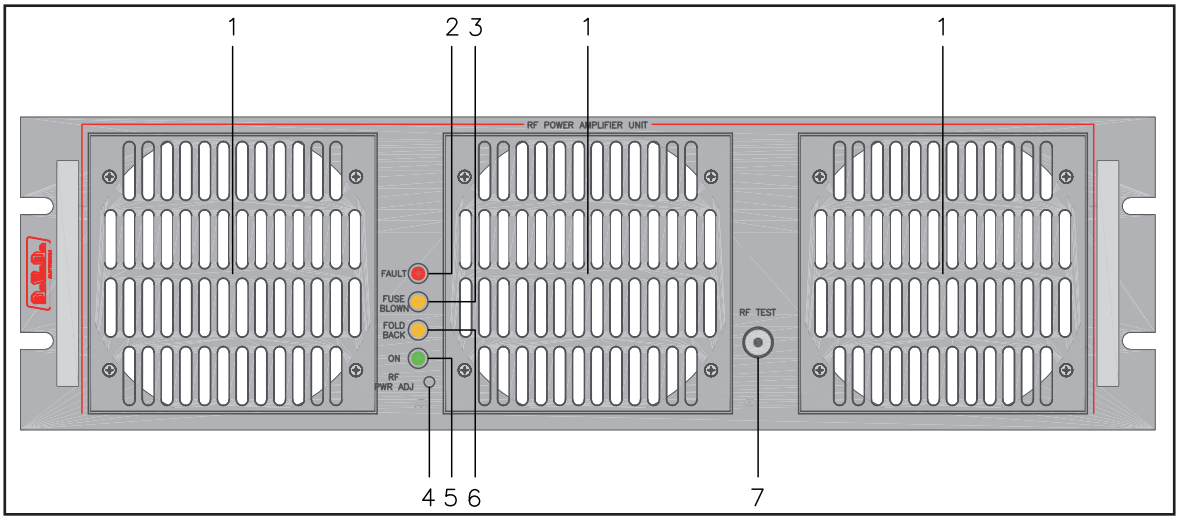
6.3.5 Interconnection PS-RF

Type: DB37 female



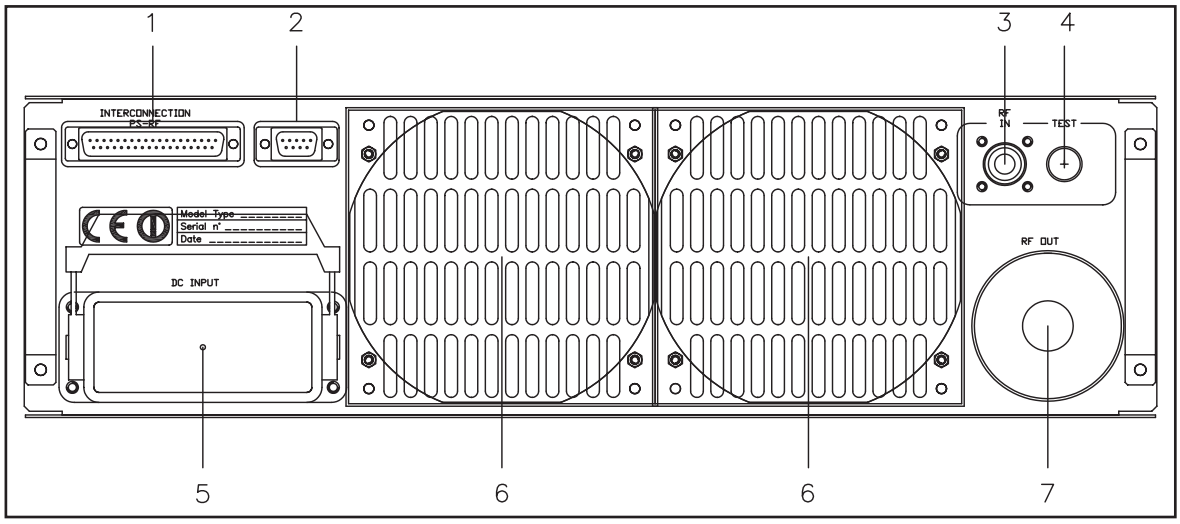
1	GND, Internally connected with 12/14/15/23/25/26/28/31/33
2	V TOT
3	R PWR
4	TEMP
5	PS OFF
6	PS REG
7	PWR REG
8	ON OFF
9	IRQ
10	CLIX
11	RESET AL
12	GND, Internally connected with 1/14/15/23/25/26/28/31/33
13	485+
14	GND, Internally connected with 1/12/15/23/25/26/28/31/33
15	GND, Internally connected with 1/12/14/23/25/26/28/31/33
16	NC
17	AC3, Internally connected with 35
18	NC
20	I TOT
19	AC4, Internally connected with 37
21	F PWR
22	INP PWR
23	GND, Internally connected with 1/12/14/15/25/26/28/31/33
24	PS STATUS
25	GND, Internally connected with 1/12/14/15/23/26/28/31/33
26	GND, Internally connected with 1/12/14/15/23/25/28/31/33
27	ST BY
28	GND, Internally connected with 1/12/14/15/23/25/26/31/33
29	FAULT
30	FUSE PS
31	GND, Internally connected with 1/12/14/15/23/25/26/28/33
32	485-
33	GND, Internally connected with 1/12/14/15/23/25/26/28/31
34	NC
35	AC3, Internally connected with 17
36	NC
37	AC4, Internally connected with 19

6.4 RF Module Frontal Panel



[1]	AIR FLOW	Grill for the ventilation flow passage
[2]	FAULT	Red LED that indicates a fault that cannot be automatically reverted
[3]	FUSE BLOWN	Red LED that indicates the presence of one or more broken fuses
[4]	RF PWR ADJ	Power regulation trimmer - A.G.C. control
[5]	ON	Green LED indicating that the amplifier is switched on
[6]	FOLDBACK	Yellow LED indicating that the foldback function is active (automatic reduction of the distributed power)
[7]	RF TEST	BNC connector for RF monitor output. The output level is -60dB referred to the power ouput in 87.5-108 MHz range

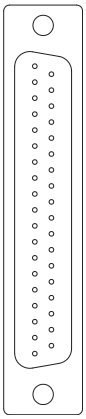
6.5 RF module Rear Panel



[1] INTERCONNECTION PS-RF — DB37 connector for interfacement with PS part
[2] — DB9 connector reserved for future uses
[3] RF IN — RF input connector (“N” type)
[4] RF IN TEST — Connector for the drawn not standardized of the modulator input signal
[5] PLUG — Plug for the supply of $50V_{DC}$ incoming from module PS
[6] AIR FLOW — Grill for the ventilation flow passage
[7] RF OUT — RF output connector (7/8” EIA flange)

6.5.1 Interconnection PS-RF

Type: DB37 female



1 GND, internally connected with 12/14/15/23/25/26/28/31/33
2 V TOT
3 R PWR
4 TEMP
5 PS OFF
6 PS REG
7 PWR REG
8 ON OFF
9 IRQ
10 CLIX
11 RESET AL
12 GND, internally connected with 1/14/15/23/25/26/28/31/33
13 485+
14 GND, internally connected with 1/12/15/23/25/26/28/31/33
15 GND, internally connected with 1/12/14/23/25/26/28/31/33
16 NC
17 AC3, internally connected with 35
18 NC
20 I TOT
19 AC4, internally connected with 37
21 F PWR
22 INP PWR
23 GND, internally connected with 1/12/14/15/25/26/28/31/33
24 PS STATUS
25 GND, internally connected with 1/12/14/15/23/26/28/31/33
26 GND, internally connected with 1/12/14/15/23/25/28/31/33
27 ST BY
28 GND, internally connected with 1/12/14/15/23/25/26/31/33
29 FAULT
30 FUSE PS
31 GND, internally connected with 1/12/14/15/23/25/26/28/33
32 485-
33 GND, internally connected with 1/12/14/15/23/25/26/28/31
34 NC
35 AC3, internally connected with 17
36 GND, Internally connected with PIN34 of JP5 of the Bias board SLMTPRTPJ4K1(mod. **PJ3000M-C**).
NC (mod. **PJ2000M-C** & **PJ2500M-C**)
37 AC4, internally connected with Internamente connesso con 19

7.

7.1

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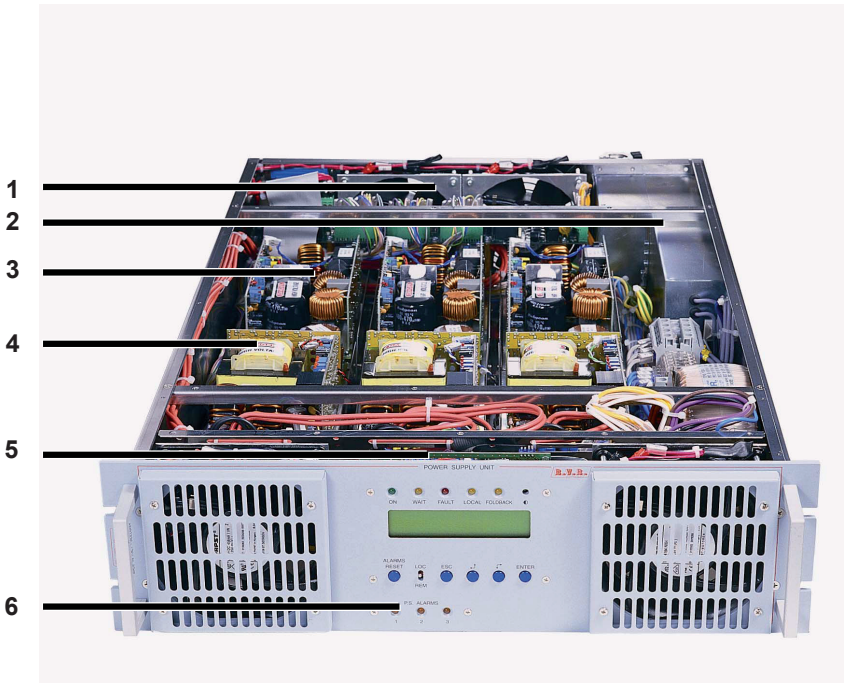
8. Operating theory

The figure shows the PS and the RF part of amplifier seen from above. The various cards are described in this chapter.

- Top View of PS secition with PFC:

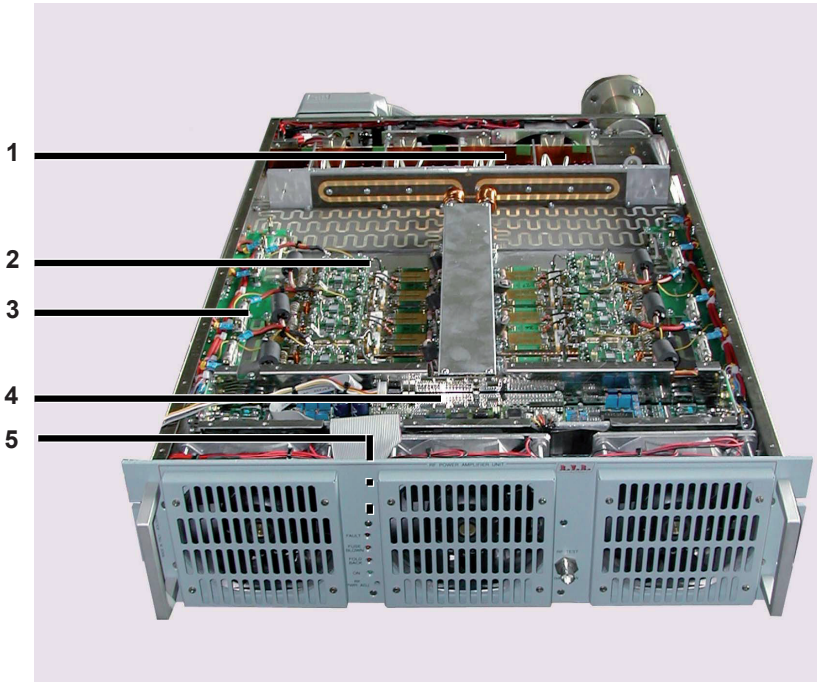


1) PS-RF Interface Board
   SLINPSP2K01 (**PJ2000M-C & PJ2500M-C**) / **SLINPSP2K03** (**PJ3000M-C**)
2) Surge Protection Board **SLSRGPRPJ2K1**
3) PFC
   PFCPSL1000 (**PJ2000M-C & PJ2500M-C**) / **PFCPSL5037** (**PJ3000M-C**)
4) Power Supply
   PSL1000/PJ2K (**PJ2000M-C & PJ2500M-C**) / **PSL5037** (**PJ3000M-C**)
5) CPU Board (**PROTPJ-HCL**)
6) LEDs Board
   SLLEDPSPJ2K2 (**PJ2000M-C & PJ2500M-C**) / **SL046LD1001** (**PJ3000M-C**)

- Top View of PS section with Rectifier (only **PJ2000M-C** e **PJ2500M-C**)

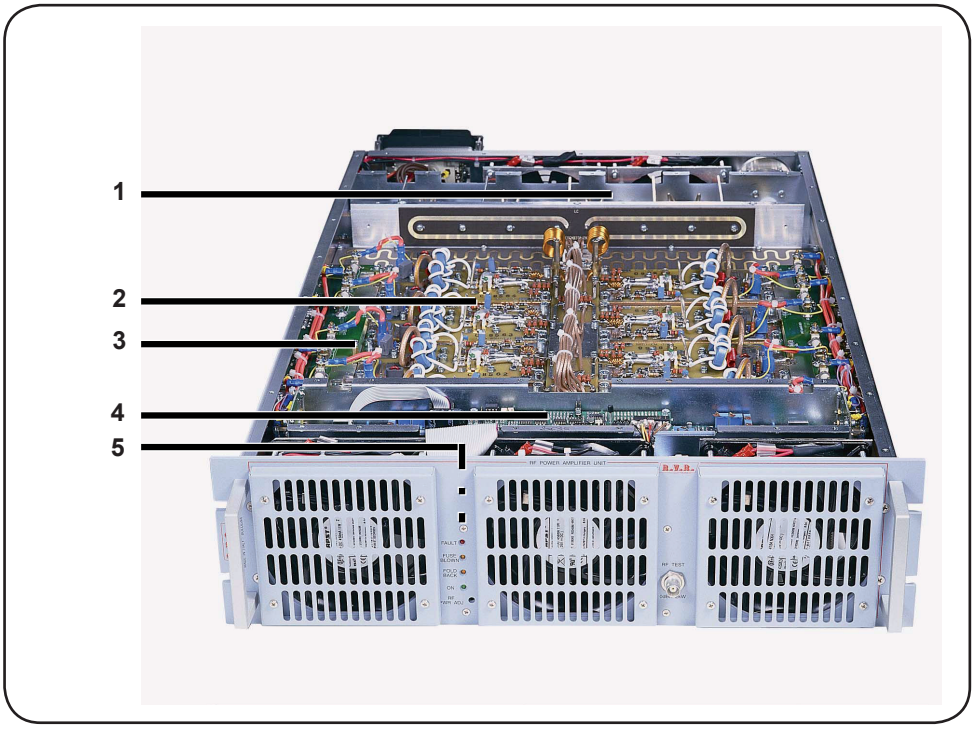
1) PS-RF Inteface board **SLINPSP2K01**
2) Surge Protection Board **SLSRGPRPJ2K1**
3) Rectifiers **RCTPSL1000**
4) Power Supply **PSL1000/PJ2K**
5) CPU Boards **PROTPJ-HCL**
6) LEDs Boards **SLLEDPSPJ2K2**

- Top View of RF section (mod. **PJ3000M-C**)



1) Low-pass Filter Board **SLLPFPJ2KLST**
2) Amplifier Modules **SL046RF1001**
3) Fuses Board **SLFUSRFPJ4K1**
4) Bias Boards **SLMTPRTPJ4K1** & CPU Board **CPUPJ2KMC**
5) LEDs Boards **SLLEDRFPJ2K1**

- Top view of RF section (mod. **PJ2500M-C** & **PJ2000M-C**)



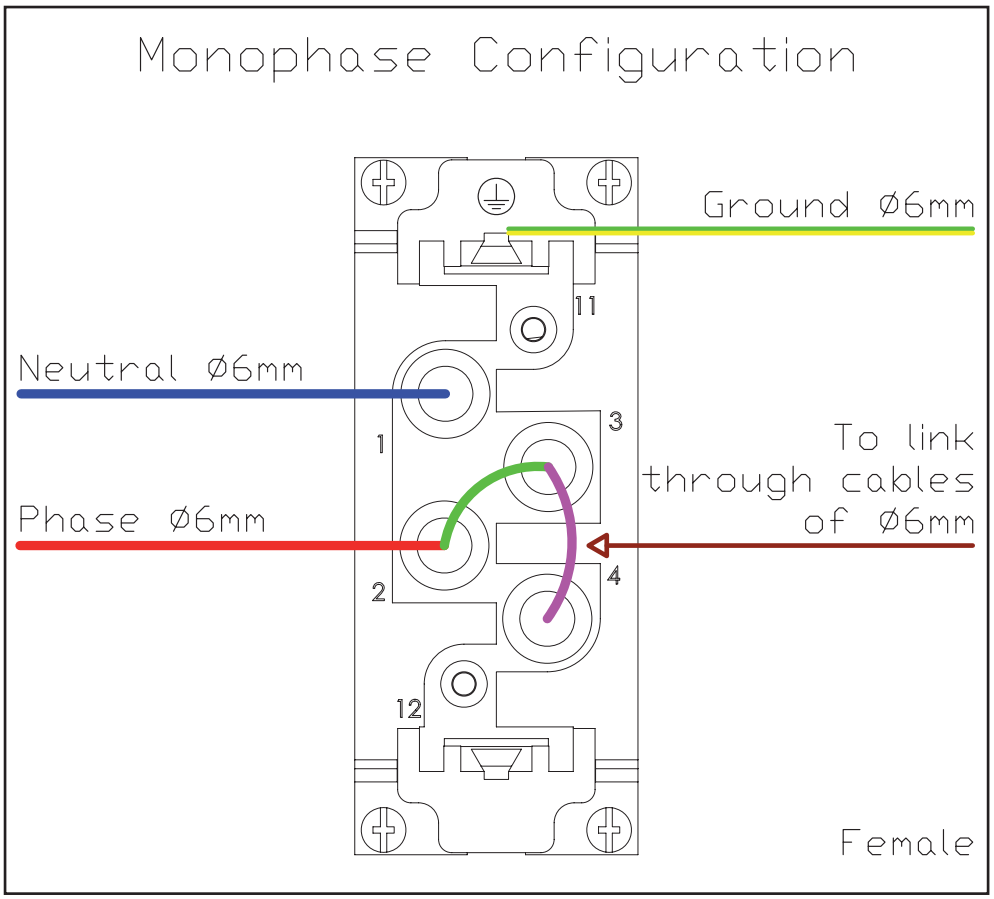
1) Low-pass Filter Board **SLLPFPJ2KLST**
2) Amplifier Modules
   SL042RF1001 (**mod. PJ2000M-C)** / (**SL010RF4001**) **mod. PJ2500M-C**
3) Fuses Board **SLFUSRFPJ2K1**
4) Bias Boards **SLMTPRTPJ2K1** & CPU Board **CPUPJ2KMC**
5) LEDs Boards **SLLEDRFPJ2K1**

8.1 Power Supply Change

To use the amplifier with different types of power supply you should connect the mains power supply socket as outlined in chapter 5. Also modify the connections inside the varistors board box as explained below.

In order to access the varistors board box, remove the screws from the side and back of the PS module, which keep it in place, and take out the box.

8.1.1 Single-Phase Wiring

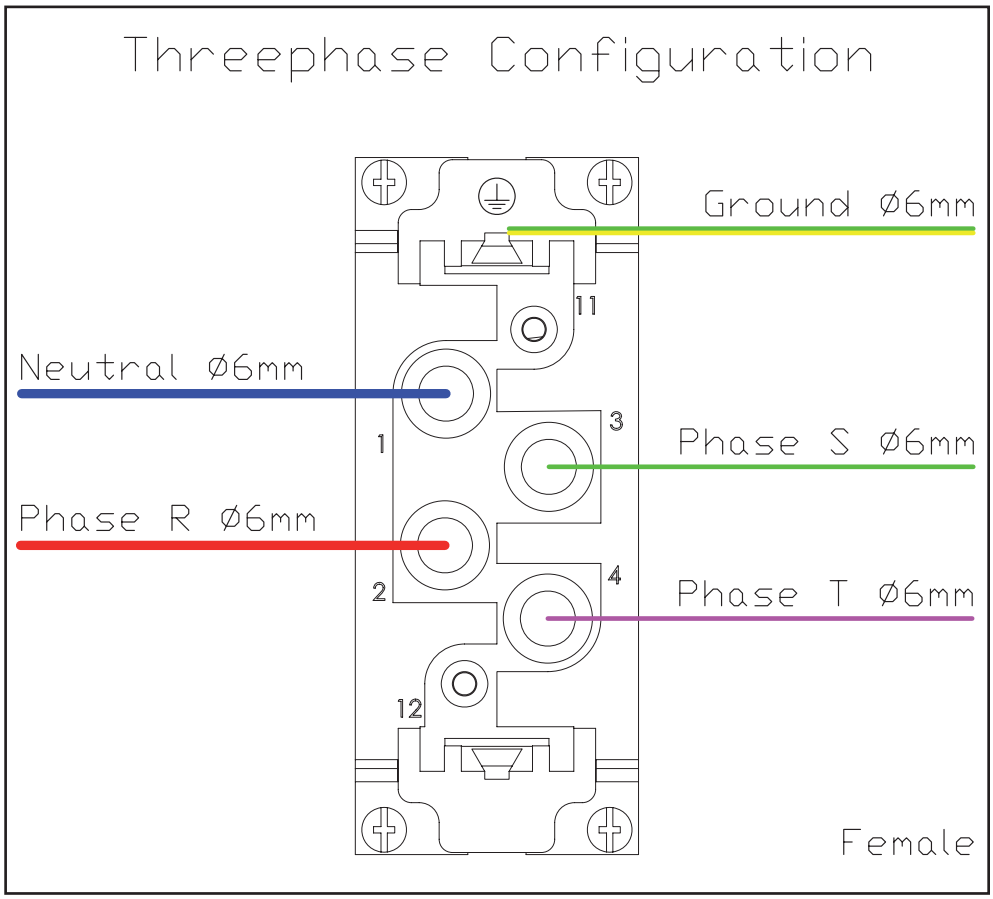


WARNING: the power supply in single-phase can be used only with 208/230V voltage.

For the single-phase, the configuration of the external power supply plug must have the following characteristics:

- PIN1 of the main connector is connected to Neutral wire.
- PIN2 of the main connector is connected to Phase wire and internally connected to PIN3 by Ø 6mm wire.
- PIN3 of the main connector is internally connected to PIN2 and to PIN4 by Ø 6mm wire.
- PIN4 of the main connector is internally connected to PIN3 by Ø 6mm wire.
- PIN5 is directly wired to ground.

8.1.2 Three-Phase Wiring



For the three-phase, the configuration of the external power supply plug must have the following characteristics:

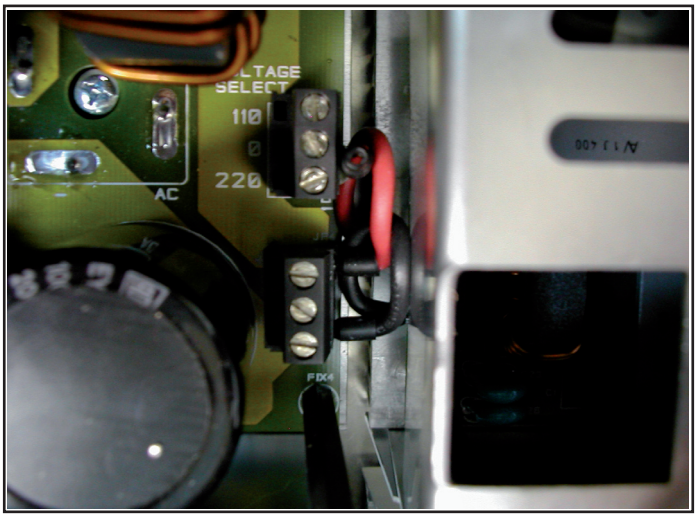
- PIN1 of the main connector is connected to Neutral wire.
- PIN2 of the main connector is connected to Phase R Wire.
- PIN3 of the main connector is connected to Phase S Wire.
- PIN4 of the main connector is connected to Phase T Wire.
- PIN5 is directly wired to ground.

8.1.3 Voltage Change

WARNING: the single-phase power supply may be used only with 208/230 Volts.

Proceed as follows to change voltage inside the machine:

- Make the JP3 connection, on the Rectifier card, between PIN 1 and 2 to select 230 Volts, or between PIN 2 and 3 for 115 Volts.



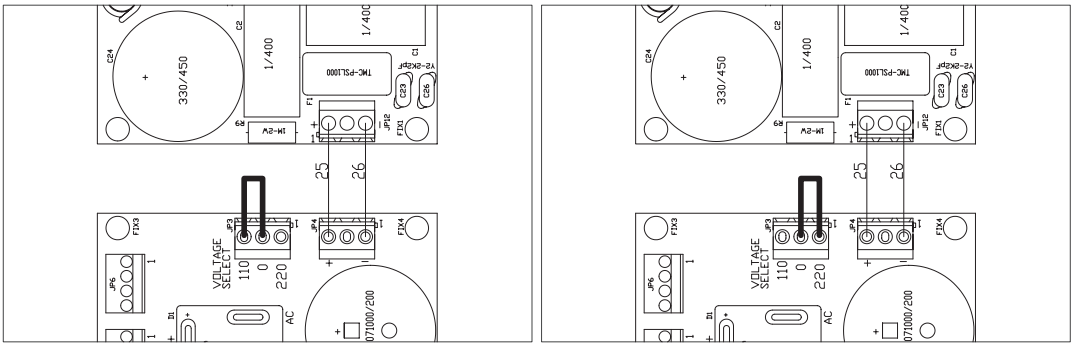
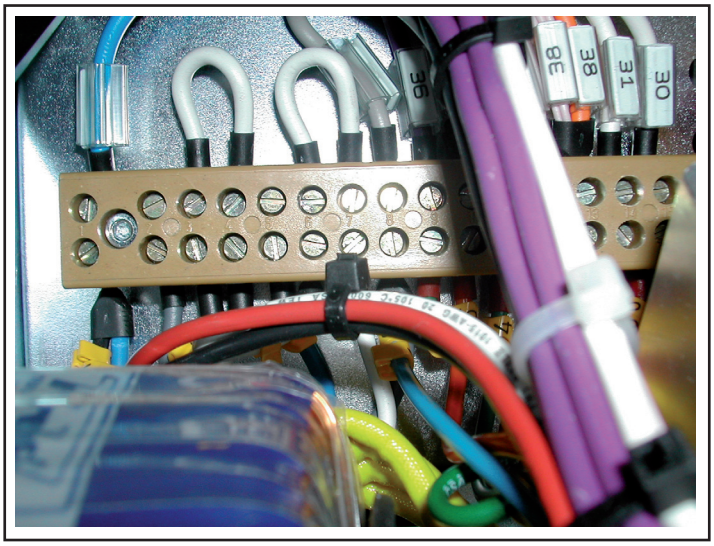


Figure 8-1: Connection for the selection of 115 or 208/230 Volts

- In order to select the 230 Volts on the connector inside the PS section near the transformer, make the connection between PIN 3 and 4 and PIN 6 and 7, or between PIN 2 and 3 and PIN 5 and 6 for 115 Volts.



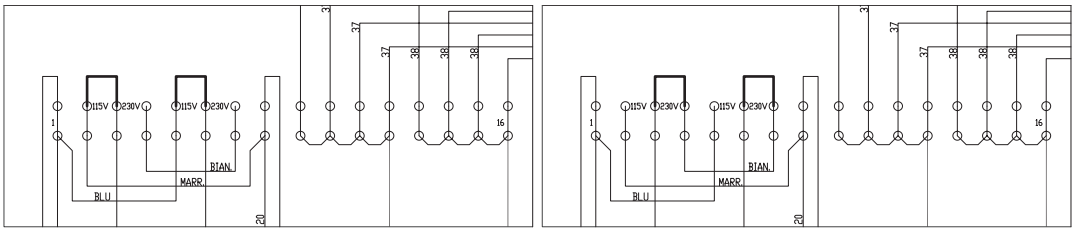


Figure 8-2: Connection for the selection of 115V or 208/230V three fase with neutral wire

8.2 PS Part

8.2.1 Surge Protection

This card's main function is to avoid any damage to the internal cards by blocking the contact before current reaches the equipment in case overvoltages occur.

8.2.2 Power Supply

The three power supply modules are located in the middle part of the amplifier. The power supply units are mounted on a cooling fin to cool the amplifier by forced ventilation.

The amplifier houses a transformer the input voltage of which may be selected between 115 and 230 Volts.

The transformer is fitted with three secondary wires: A) 18-0-18 V, B) 0-17 V, C) 0-11.5 V that supply power to the cards inside the equipment.

8.2.3 PFC Unit or Rectifier

The PFC unit is a rectifier that modulates the current absorbed so that the wave shape is the most possible sinusoidal, obtaining a factor of power of 99%.

The PFC can work with input supply voltages from 90 V to 250 V. A rectified voltage of 350 V is present on the output.

In place of PFC units, can be installed “traditional” rectifiers units (without power factor corrector). Its task is to rectify and stabilize the shape of the voltage produced by the power supply modules by fixing the voltage value to the value required by the internal circuitry.

This card also applies a resistive load when the amplifier is turned on and excludes said load after a short time to reduce current peaks in the transformer on turning it on (*SOFT-START*).

8.2.4 PS-RF Interface Board

This interface board is installed at the back of the amplifier for collecting the main signals of the machine and making them available on the connectors. This interface is connected to the three rectifiers, the CPU, the fans, the transformer from which it receives the signals and to which it issues commands.

This interface card is designed to make the PS part communicate with the RF part and making available the dedicated signals at the specific connector for each part.

8.2.5 LEDs Board

Three LEDs are present on this board for indicating the operating status of the three power supply modules.

The lighting up of a LED indicates a malfunction in the associated module.

8.2.6 CPU

This subsystem is made up of three cards: the CPU card, the display card and the analog card.

The CPU subsystem implements all the software functions (measurements, protection, control, data display, communications) outlined in the previous chapters.

This card carries the signals to the DB25 telemetry connector that is on the machine’s back panel. The connector is fitted with 7 analog outputs, 8 open-collector digital outputs and 4 digital inputs. It also manages the DB9 signals associated with the RS232 connector, for interfacing with other equipment and for the default programming functions, and the DB9 connector for communications in I^2C standard.

8.3 RF Part

8.3.1 RF Power Amplifier

The RF power amplifying section consists in 8 (mod. **PJ2000M-C** & **PJ2500M-C**) or 6 (mod. **PJ3000M-C**) power modules coupled by a Wilkinson splitter and combiner and implemented in strip-line technology.

The RF modules, the splitter and the combiner are housed inside the top part of the equipment.

The whole RF section is mounted on the fin that cools the equipment by means of forced ventilation.

Each RF module supplies 550 watts in **PJ3000M-C** model, 350 watts in **PJ2500M-C** model, or 300 watts in **PJ2000M-C** model, with 4 to 6 pilot power watts and is powered by the switching PSU.

The modules' operating parameters in standby are as follows:

VDC=50V Vgs=3.5V Idq=200mA

The active device used in the amplifier modules is a Mosfet (2x BLF278 in **PJ3000M-C** model, SD2942 in **PJ2500M-C** model, or BLF278 in **PJ2000M-C** model).

8.3.2 Wilkinson Splitter and Combiner

Both the splitter and the combiner are made in strip-line technology.

The splitter is used for splitting power arriving from the exciter and supplying one part to each of the RF modules.

The combiner is then used to combine power output from each module to obtain the amplifier's total power.

The two cards ensure equal phases among the powers generated by the RF modules. One power resistance is used for dissipating the offset power that might be present in case a module breaks down.

The Splitter card is also fitted with the temperature sensor which is monitored by the software.

8.3.3 Bias Board

The task of this card is to check and correct the bias voltage of the Mosfets in the RF amplification section.

This card also supplies the following measurements: current and voltage of each

module, total current and average voltage.

8.3.4 Low-Pass Filter

This filter is located at the back of the equipment.

The task of the low-pass filter is to reduce the harmonic emissions of the amplifier to below the levels allowed by standards.

8.3.5 Directional Coupler

The task of these two cards that seem identical is to supply the power measurement. They are installed on the input RF connector on the inside of the machine. One card supplies the amplifier's forward power whereas the other one supplies the reflected power.

8.3.6 Control Board

The control board acts as an auxiliary card for the PROTF card in the PS section should the latter fail to trip due to a malfunction. It implements all the functions associated with measurements, protection, control and communications and is even capable of detecting the individual voltages or currents inside the machine, in addition to the overall ones.

If pre-arranged, this Board can carry the signals to the DB9 connector located on the machine's back panel in RS485 standard.

8.3.7 LEDs Board

This card is fitted with 4 warning LEDs that indicate the machine's general operating status.

It also has a trimmer for adjusting power (AGC control). Use a small screwdriver to change the delivered power.

9. “Low-Drive Power” Option (/LD)

The figure shown the top view of RF section of the equipment with LD option. The board comes described in the continuation of this chapter.

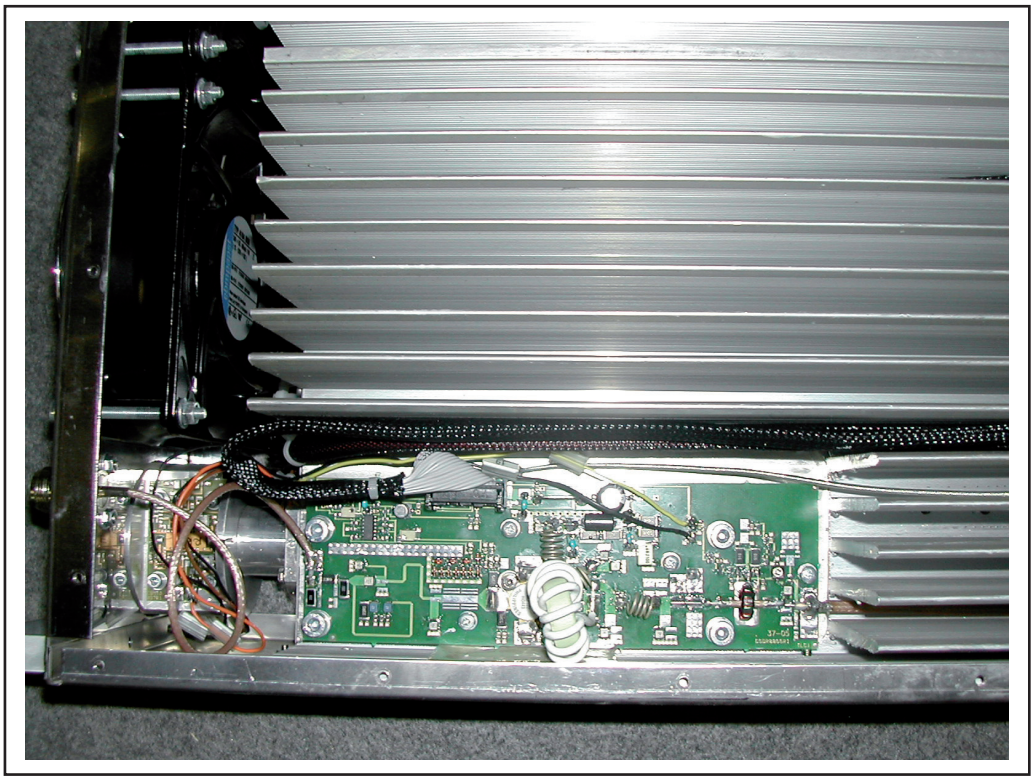


Figure 9-1: “Low-Drive power” Board

9.1 “Low-Drive power” Board

The “Low-Drive power” board contains an RF amplifier with only one stage that, with a power of about 1W, can supply an output power of approximately 30W suitable to pilot **PJ2000M-C** and **PJ2500M-C**, with a total gain of approximately 15dB.

The active device utilized in the amplifier modules is a Mosfet (BLF177) and uses for the feeding the same voltage of $50V_{DC}$ used from the eight RF amplifiers modules.

On the output stage of this board is present a directional coupler that measure the reflected and forward power; the latest comes acquired from the control software that represents it legible like input power.

The board is mounted on the fin that supplies to its cooling through forced ventilation.

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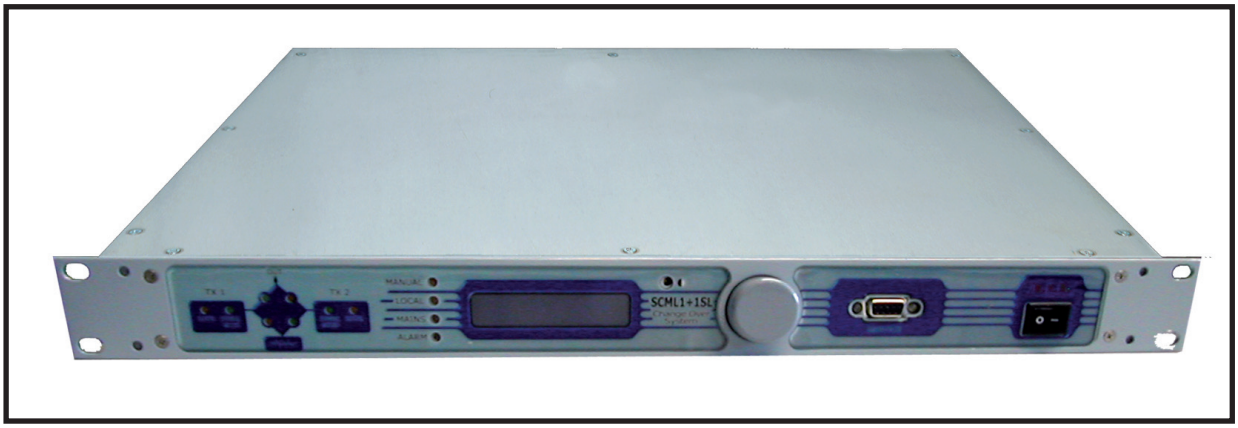
SCML1+1SL



User Manual
Volume 1

Manufactured by R.V.R. ELETTRONICA Italy

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SCML1+1SL - User Manual
Version 1.3

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Notification of intended purpose and limitations of product use
This product is a FM transmitter intended for FM audio broadcasting. It utilises operating frequencies not harmonised in the intended countries of use.
The user must obtain a license before using the product in intended country of use. Ensure respective country licensing requirements are complied with.
Limitations of use can apply in respect of operating freuency, transmitter power and/or channel spacing.

Declaration of Conformity
Hereby, R.V.R. Elettronica SpA, declares that this FM transmitter is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.

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IMPORTANT

The lightning flash with arrowhead, within a triangle, is intended to alert the user of the presence of dangerous voltage that may constitute a risk of electric shock.

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the equipment.

1. Preliminary Instructions

• General Warnings

This equipment should only be operated, installed and maintained by "trained" or "qualified" personnel who are familiar with risks involved in working on electric and electronic circuits. "Trained" means personnel who have technical knowledge of equipment operation and who are responsible for their own safety and that of other unqualified personnel placed under their supervision when working on the equipment.
"Qualified" means personnel who are trained in and experienced with equipment operation and who are responsible for their own safety and that of other unqualified personnel placed under their supervision when working on the equipment.

WARNING: Residual voltage may be present inside the equipment even when the ON/OFF switch is set to Off. Before servicing the equipment, disconnect the power cord or switch off the main power panel and make sure the safety earth connection is connected. Some service situations may require inspecting the equipment with live circuits. Only trained and qualified personnel may work on the equipment live and shall be assisted by a trained person who shall keep ready to disconnect power supply at need.

R.V.R. Elettronica SpA shall not be liable for injury to persons or damage to property resulting from improper use or operation by trained/untrained and qualified/unqualified persons.

WARNING: The equipment is not water resistant. Any water entering the enclosure might impair proper operation. To prevent the risk of electrical shock or fire, do not expose this equipment to rain, dripping or moisture.

Please observe local codes and fire prevention rules when installing and operating this equipment.

WARNING: This equipment contains exposed live parts involving an electrical shock hazard. Always disconnect power supply before removing any covers or other parts of the equipment.

Ventilation slits and holes are provided to ensure reliable operation and prevent overheating; do not obstruct or cover these slits. Do not obstruct the ventilation slits under any circumstances. The product must not be incorporated in a rack unless adequate ventilation is provided or the manufacturer's instructions are followed closely.

WARNING: This equipment can radiate radiofrequency energy and, if not installed in compliance with manual instructions and applicable regulations, may cause interference with radio communications.

WARNING: This equipment is fitted with earth connections both in the power cord and for the chassis. Make sure both are properly connected.

Operation of this equipment in a residential area may cause radio interference, in which case the user may be required to take adequate measures.

The specifications and data contained herein are provided for information only and are subject to changes without prior notice. **R.V.R. Elettronica SpA** disclaims all warranties, express or implied.While R.V.R. Elettronica SpA attempts to provide accurate information, it cannot accept responsibility or liability for any errors or inaccuracies in this manual, including the products and the software described herein. **R.V.R. Elettronica SpA** reserves the right to make changes to equipment design and/or specifications and to this manual at any time without prior notice.

• Notice concerning product intended purpose and use limitations.

This product is a radio transmitter suitable for frequency-modulation audio radio broadcasting. Its operating frequencies are not harmonised in designated user countries. Before operating this equipment, user must obtain a licence to use radio spectrum from the competent authority in the designated user country. Operating frequency, transmitter power and other characteristics of the transmission system are subject to restrictions as specified in the licence.

2. Warranty

La **R.V.R. Elettronica S.P.A.** warrants this product to be free from defects in workmanship and its proper operation subject to the limitations set forth in the supplied Terms and Conditions. Please read the Terms and Conditions carefully, as purchase of the product or acceptance of the order acknowledgement imply acceptance of the Terms and Conditions. For the latest updated terms and conditions, please visit our web site at WWW.RVR.IT. The web site may be modified, removed or updated for any reason whatsoever without prior notice. The warranty will become null and void in the event the product enclosure is opened, the product is physically damaged, is repaired by unauthorised persons or is used for purposes other than its intended use, as well as in the event of improper use, unauthorised changes or neglect.
In the event a defect is found, follow this procedure:

1 Contact the seller or distributor who sold the equipment; provide a description of the problem or malfunction for the event a quick fix is available.

Sellers and Distributors can provide the necessary information to troubleshoot the most frequently encountered problems. Normally, Sellers and Distributors can offer a faster repair service than the Manufacturer would. Please note that Sellers can pinpoint problems due to wrong installation.

2 If your Seller cannot help you, contact **R.V.R. Elettronica** and describe the problem; if our staff deems it appropriate, you will receive an authorisation to return the equipment along with suitable instructions;

3 When you have received the authorisation, you may return the unit. Pack the unit carefully before shipment; use the original packaging whenever possible and seal the package perfectly. The customer bears all risks of loss (i.e., R.V.R. shall not be liable for loss or damage) until the package reaches the R.V.R. factory. For this

reason, we recommend insuring the goods for their full value. Returns must be sent on a C.I.F. basis (PREPAID) to the address stated on the authorisation as specified by the R.V.R. Service Manager.

Units returned without a return authorisation may be rejected and sent back to the sender.

4 Be sure to include a detailed report mentioning all problems you have found and copy of your original invoice (to show when the warranty period began) with the shipment.

Please send spare and warranty replacement parts orders to the address provided below. Make sure to specify equipment model and serial number, as well as part description and quantity.

R.V.R. Elettronica SpA
Via del Fonditore, 2/2c
40138 BOLOGNA ITALY
Tel. +39 051 6010506

3. First Aid

All personnel engaged in equipment installation, operation and maintenance must be familiar with first aid procedures and routines.

3.1 Electric shock treatment

3.1.1 If the victim is unconscious

Follow the first aid procedures outlined below.

- Lay the victim down on his/her back on a firm surface.
- the neck and tilt the head backwards to free the airway system (**Figure 1**).

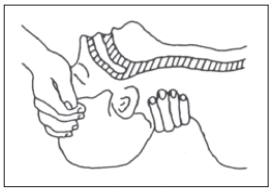


Figure 1

- If needed, open the victim's mouth and check for breathing.
- If there is no breathing, start artificial respiration without delay (**Figure 2**) as follows: tilt the head backwards, pinch the nostrils, seal your mouth around the victim's mouth and give four fast rescue breaths.

Figure 2

- Check for heartbeat (**Figure 3**); if there is no heartbeat, begin chest compressions immediately (**Figure 4**) placing your hands in the centre of the victim's chest (**Figure 5**).

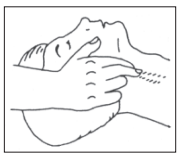


Figure 3

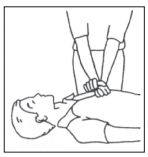


Figure 4

Figure 5

- One rescuer: give 2 quick rescue breaths after each 15 compressions.
- Two rescuers: one rescue breath after each 5 compressions.
- Do not stop chest compressions while giving artificial breathing.
- Call for medical help as soon as possible.

3.1.2 If the victim is conscious

- Cover victim with a blanket.
- Try to reassure the victim.
- Loosen the victim's clothing and have him/her lie down.
- Call for medical help as soon as possible.

3.2 Treatment of electric burns

3.2.1 Large burns and broken skin

- Cover affected area with a clean cloth or linen.
- Do not break any blisters that have formed; remove any clothing or fabric that is stuck to the skin; apply adequate ointment.
- Administer adequate treatment for the type of accident.
- Get the victim to a hospital as quickly as possible.
- Elevate arms and legs if injured.

If medical help is not available within an hour, the victim is conscious and is not retching, administer a solution of table salt and baking soda (one teaspoon of table salt to half teaspoon of baking soda every 250 ml of water).

Have the victim slowly drink half a glass of solution for four times during a period of 15 minutes.

Stop at the first sign of retching.

Do not administer alcoholic beverages.

3.2.2 Minor burns

- Apply cold (not ice cold) strips of gauze or dress wound with clean cloth.
- Do not break any blisters that have formed; remove any clothing or fabric that is stuck to the skin; apply adequate ointment.
- If needed, have the victim change into clean, dry clothing.
- Administer adequate treatment for the type of accident.
- Get the victim to a hospital as quickly as possible.
- Elevate arms and legs if injured.

4. Unpacking

The package contains:

- 1 **SCML1+1SL**
- 1 User Manual
- 1 Mains power cable

The following accessories are also available from Your R.V.R. Dealer:

- **Accessories, spare parts and cables**

4.1 General Description

The new **SCML1+1SL** changeover family can be connected to all RVR standard equipment, as well with all kind of transmitting systems, and are characterized by:

- **SCML1+1SL/V1**: version with external Spinner relay mod. BN754067 and BN754098, for transmitters with output power range of 150W to 1000W:

- **SCML1+1SL/V2**: version with internal relay, for transmitters with output power lower than 150W:

- **SCML1+1SL/V3**: version with external Spinner relay mod. BN512690, BN640075 and BN941912, for transmitters with output power higher than 1000W:

- **SCML1+1SL/V4**: version with interface for customized external relay:

A clear and immediate representation of the working conditions through synoptic indication on the position of changeover.

Connection for the management of the main signals: Telecontrol (TC) and Telesignal (TS) are available on I/O interface.

5. Configurations

This section provides a description about the typical configurations and about the firmware of the equipment.

In the following figure is represented the dip-switches necessary to configurate the SCML1+1SL in case of change in the system configuration.

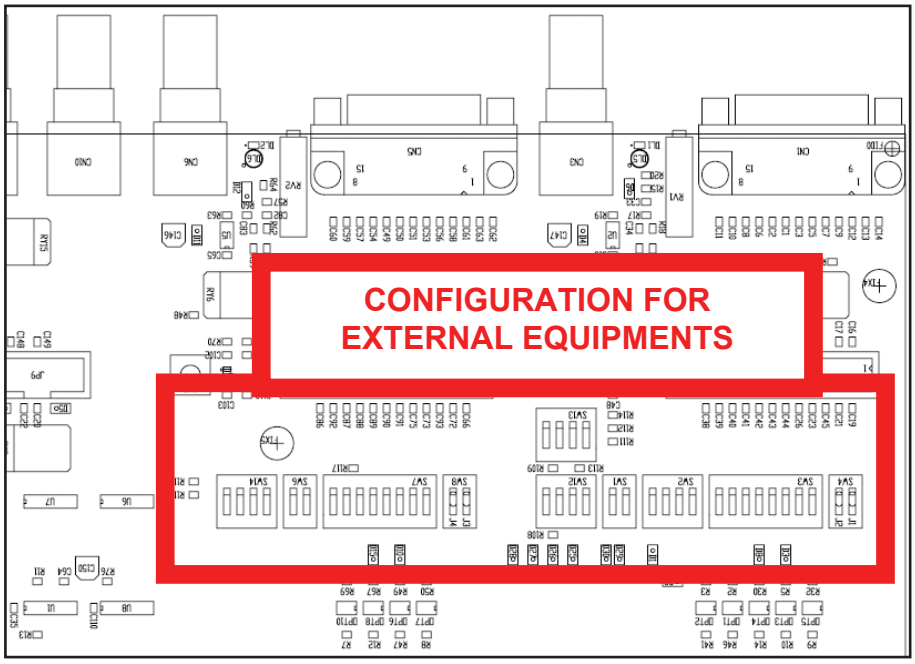
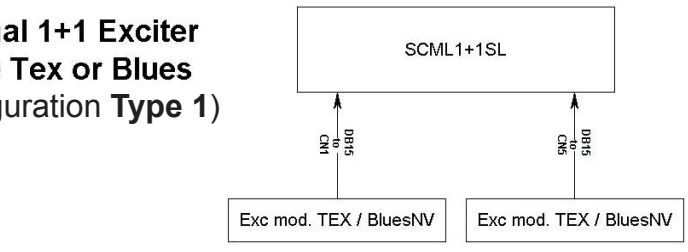


Figure 5.1: Dip-switch for external equipment configurations

5.1 Typical Configuration with Exciters of Tex and Blues family

Normal 1+1 Exciter
Type Tex or Blues
(Configuration **Type 1**)



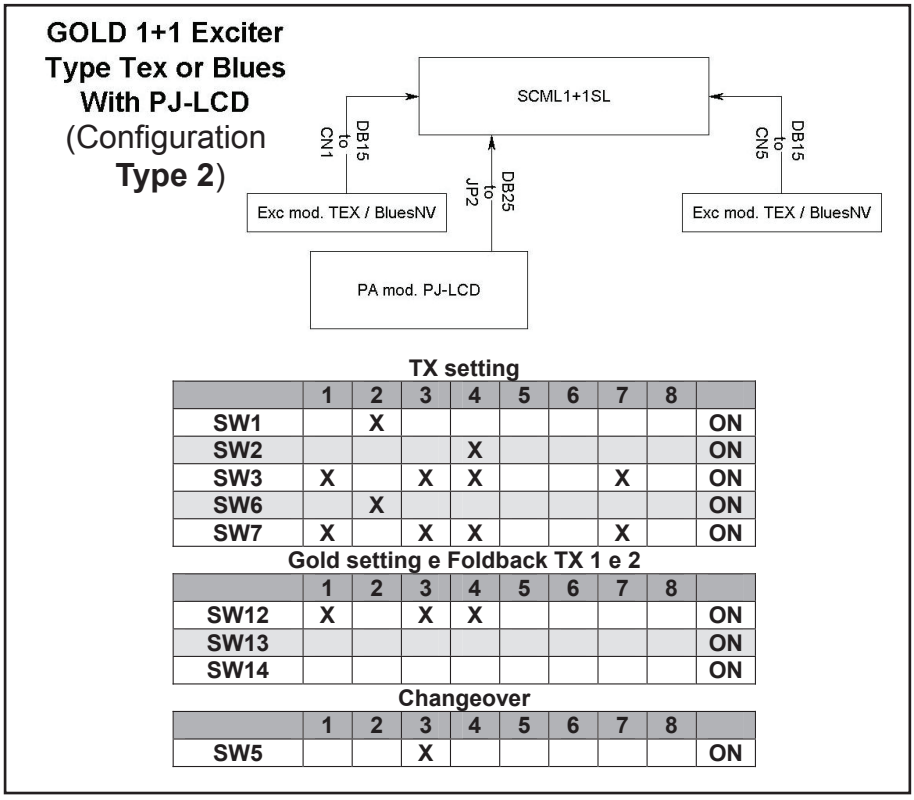
TX setting

	1	2	3	4	5	6	7	8	
SW1		X							ON
SW2									ON
SW3	X		X	X			X		ON
SW6		X							ON
SW7	X		X	X			X		ON

Gold setting e Foldback TX 1 e 2

	1	2	3	4	5	6	7	8	
SW12									ON
SW13									ON
SW14									ON

Figure 5.2: 1+1 system typical configuration for TEX or Blues Family



TX setting

	1	2	3	4	5	6	7	8	
SW1		X							ON
SW2				X					ON
SW3	X		X	X			X		ON
SW6		X							ON
SW7	X		X	X			X		ON

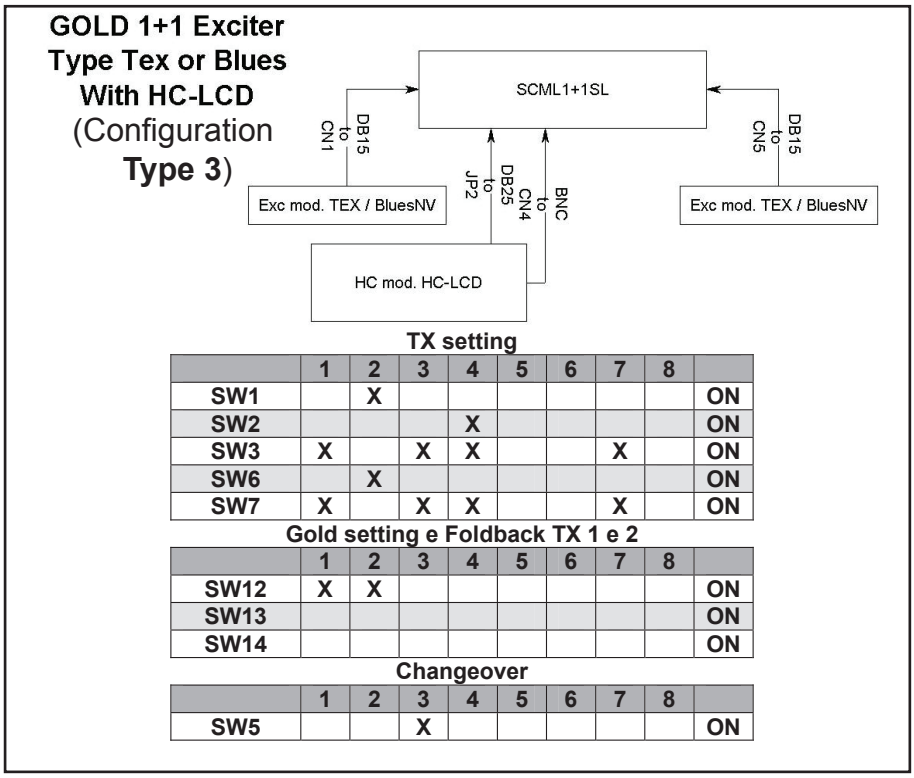
Gold setting e Foldback TX 1 e 2

	1	2	3	4	5	6	7	8	
SW12	X		X	X					ON
SW13									ON
SW14									ON

Changeover

	1	2	3	4	5	6	7	8	
SW5			X						ON

Figure 5.3: 1+1 GOLD system typical configuration for TEX or Blues and PJ-LCD



TX setting

	1	2	3	4	5	6	7	8	
SW1		X							ON
SW2				X					ON
SW3	X		X	X			X		ON
SW6		X							ON
SW7	X		X	X			X		ON

Gold setting e Foldback TX 1 e 2

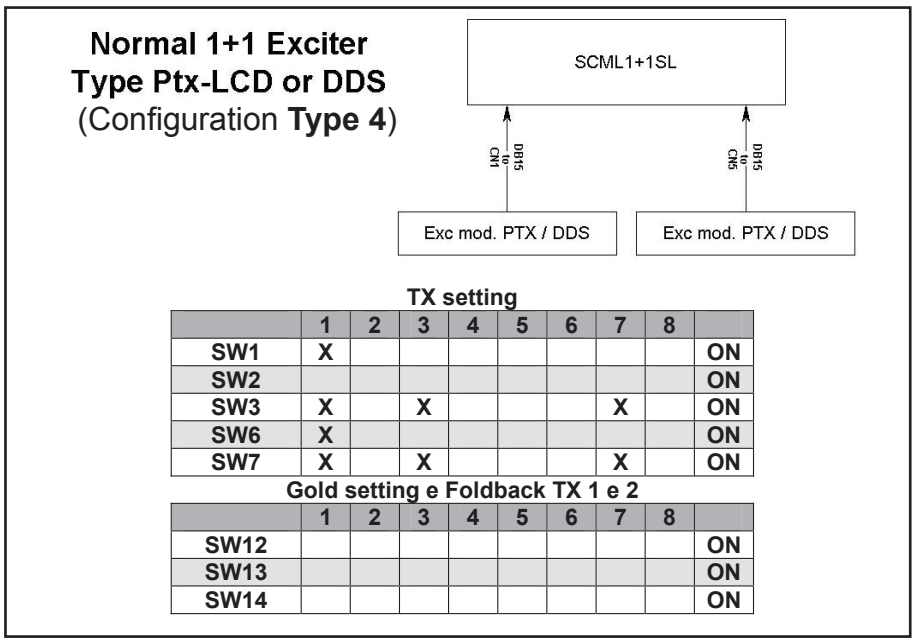
	1	2	3	4	5	6	7	8	
SW12	X	X							ON
SW13									ON
SW14									ON

Changeover

	1	2	3	4	5	6	7	8	
SW5			X						ON

Figure 5.4: 1+1 GOLD system typical configuration for TEX or Blues and HC-LCD

5.2 Typical Configuration with Exciters of PTX family



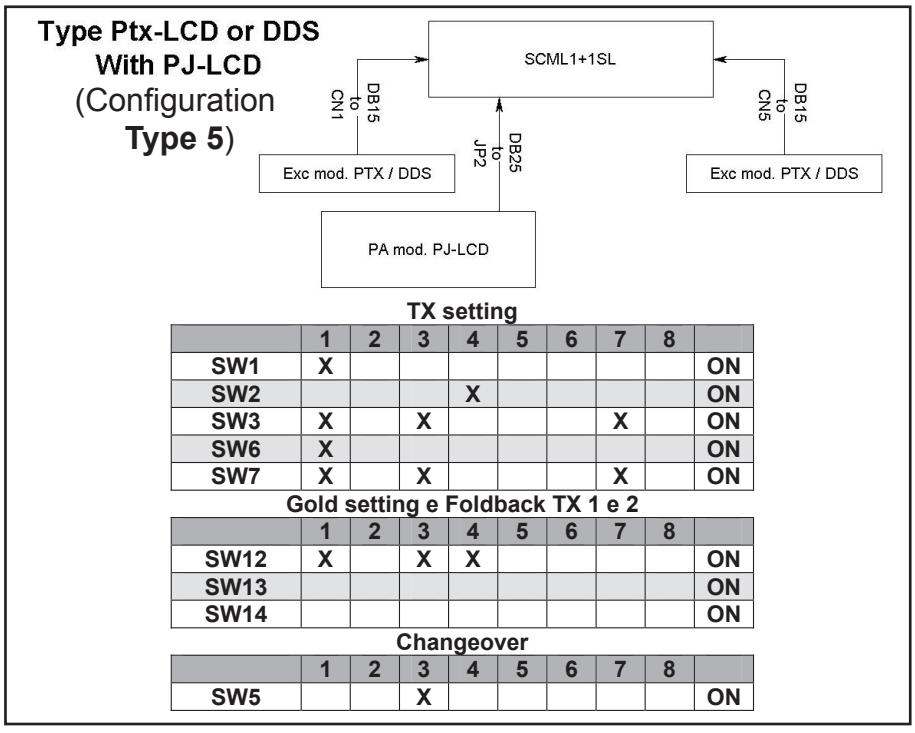
TX setting

	1	2	3	4	5	6	7	8	
SW1	X								ON
SW2									ON
SW3	X		X				X		ON
SW6	X								ON
SW7	X		X				X		ON

Gold setting e Foldback TX 1 e 2

	1	2	3	4	5	6	7	8	
SW12									ON
SW13									ON
SW14									ON

Figure 5.5: 1+1 system typical configuration for PTX LCD or DDS Family



TX setting

	1	2	3	4	5	6	7	8	
SW1	X								ON
SW2				X					ON
SW3	X		X				X		ON
SW6	X								ON
SW7	X		X				X		ON

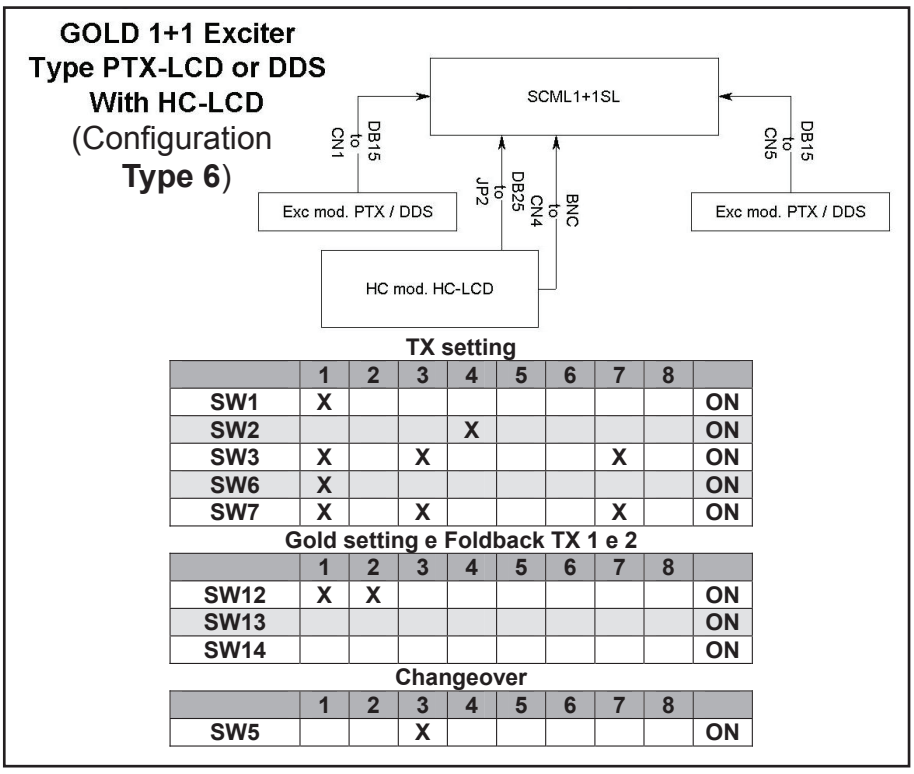
Gold setting e Foldback TX 1 e 2

	1	2	3	4	5	6	7	8	
SW12	X		X	X					ON
SW13									ON
SW14									ON

Changeover

	1	2	3	4	5	6	7	8	
SW5			X						ON

Figure 5.6: 1+1 GOLD system typical configuration for PTX LCD or DDS and PJ-LCD



TX setting

	1	2	3	4	5	6	7	8	
SW1	X								ON
SW2				X					ON
SW3	X		X				X		ON
SW6	X								ON
SW7	X		X				X		ON

Gold setting e Foldback TX 1 e 2

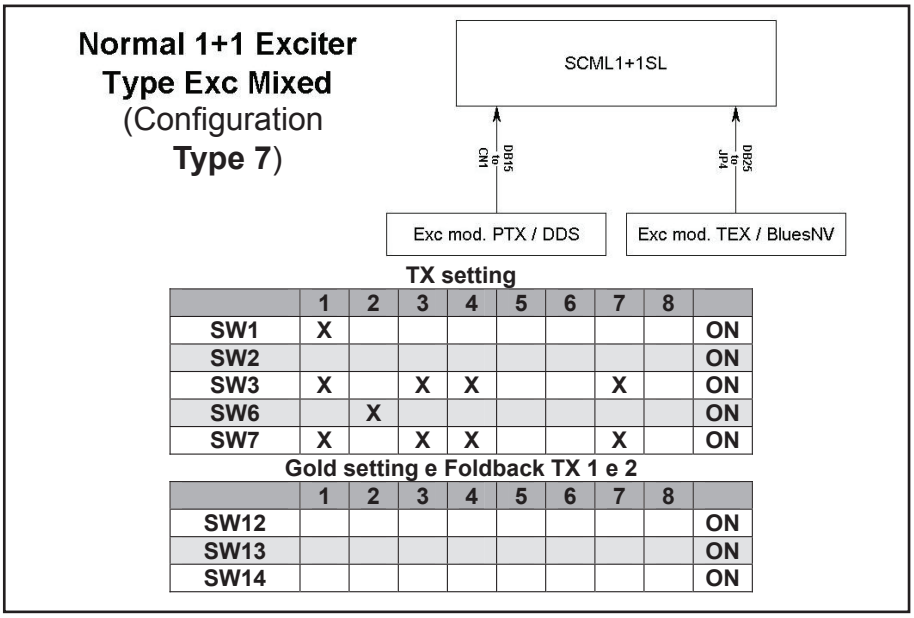
	1	2	3	4	5	6	7	8	
SW12	X	X							ON
SW13									ON
SW14									ON

Changeover

	1	2	3	4	5	6	7	8	
SW5			X						ON

Figure 5.7: 1+1 GOLD system typical configuration for PTX LCD or DDS and HC-LCD

5.3 Typical Configuration with Mixed Exciters



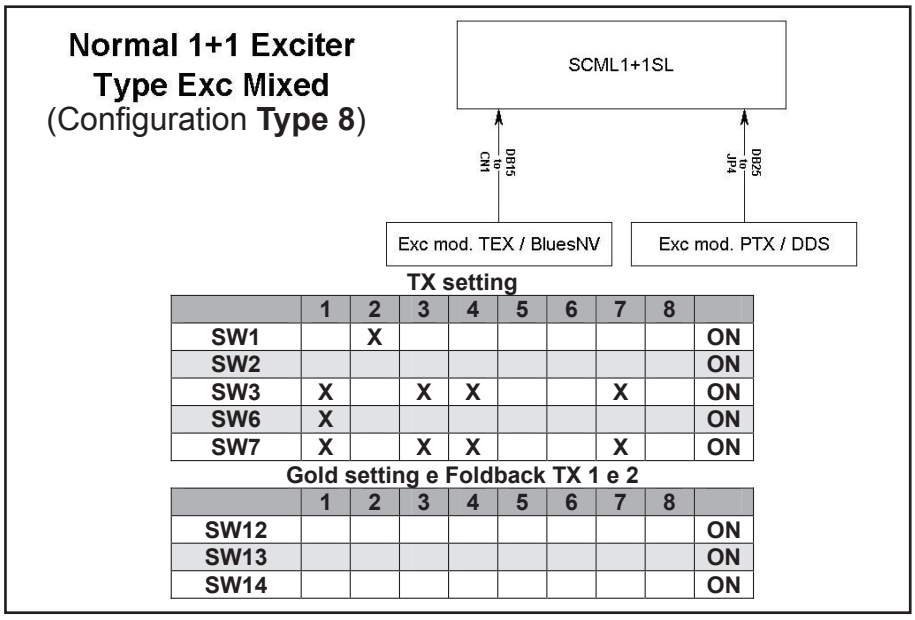
TX setting

	1	2	3	4	5	6	7	8	
SW1	X								ON
SW2									ON
SW3	X		X	X			X		ON
SW6		X							ON
SW7	X		X	X			X		ON

Gold setting e Foldback TX 1 e 2

	1	2	3	4	5	6	7	8	
SW12									ON
SW13									ON
SW14									ON

Figure 5.8: 1+1 system typical configuration for PTX LCD or DDS and TEX or Blues



TX setting

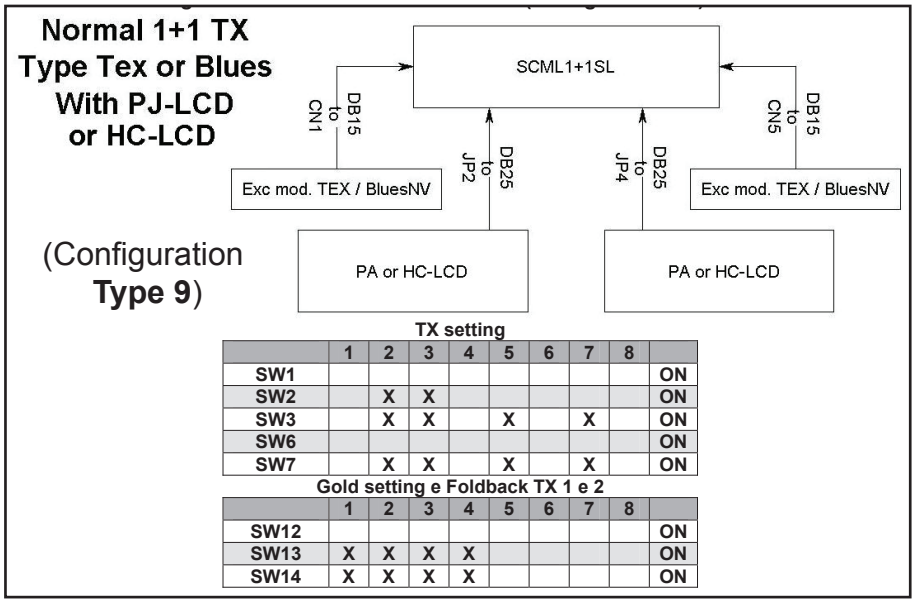
	1	2	3	4	5	6	7	8	
SW1		X							ON
SW2									ON
SW3	X		X	X			X		ON
SW6	X								ON
SW7	X		X	X			X		ON

Gold setting e Foldback TX 1 e 2

	1	2	3	4	5	6	7	8	
SW12									ON
SW13									ON
SW14									ON

Figure 5.9: 1+1 system typical configuration for TEX or Blues and PTX LCD or DDS

5.4 Typical Configuration with Transmitting systems



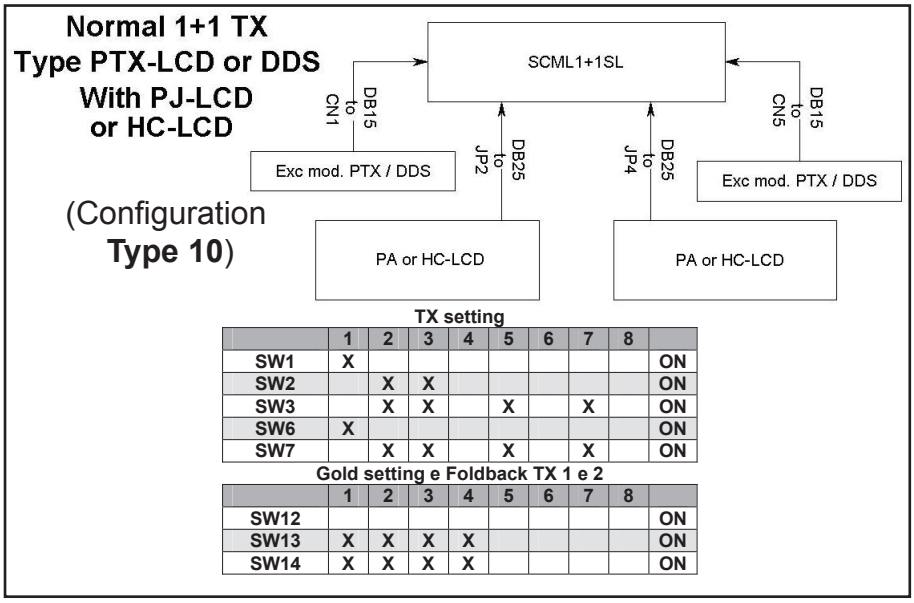
TX setting

	1	2	3	4	5	6	7	8	
SW1									ON
SW2		X	X						ON
SW3		X	X		X		X		ON
SW6									ON
SW7		X	X		X		X		ON

Gold setting e Foldback TX 1 e 2

	1	2	3	4	5	6	7	8	
SW12									ON
SW13	X	X	X	X					ON
SW14	X	X	X	X					ON

Figure 5.10: 1+1 TX system typical configuration for TEX or Blues and PJ-LCD or HC-LCD



TX setting

	1	2	3	4	5	6	7	8	
SW1	X								ON
SW2		X	X						ON
SW3		X	X		X		X		ON
SW6	X								ON
SW7		X	X		X		X		ON

Gold setting e Foldback TX 1 e 2

	1	2	3	4	5	6	7	8	
SW12									ON
SW13	X	X	X	X					ON
SW14	X	X	X	X					ON

Figure 5.11: 1+1 TX system typical configuration for PTX LCD or DDS and PJ-LCD or HC-LCD

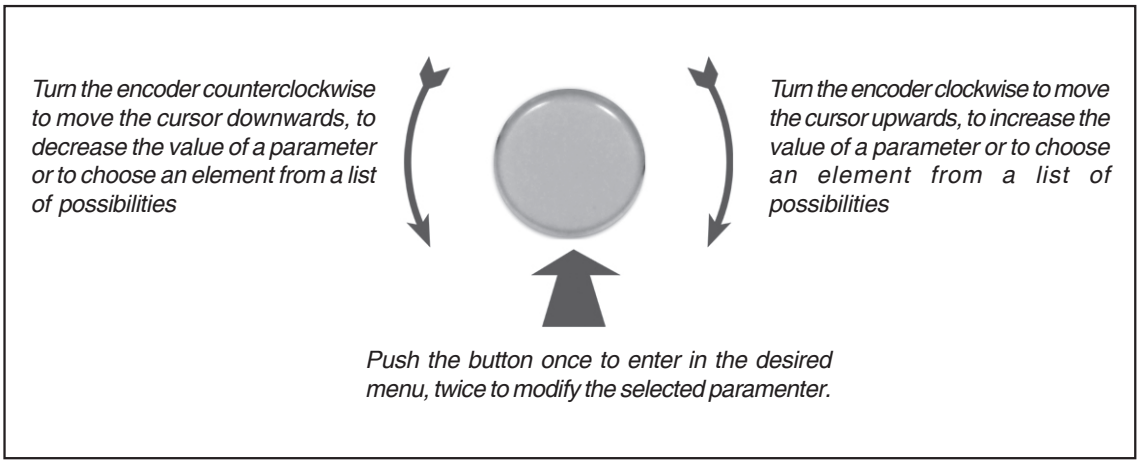
5.5 User Interface

The machine features an LCD with two lines by 16 characters that displays a set of menus.

The status of the machine is indicated by four LEDs located on the front panel: MANUAL, LOCAL, MAINS, ALARM and seven LED for synoptical signalling.

The interaction between the user and the exciter control software is performed using the encoder.

The operations that you can perform on the encoder are:


Turn the encoder counterclockwise to move the cursor downwards, to decrease the value of a parameter or to choose an element from a list of possibilities
Turn the encoder clockwise to move the cursor upwards, to increase the value of a parameter or to choose an element from a list of possibilities
Push the button once to enter in the desired menu, twice to modify the selected paramenter.

• rotation: moves the cursor shows on the display; if you turn the encoder to the left (counter clockwise), the cursor moves downwards, if you turn it right the cursor moves upwards; it also permits to increase or diminish the parameters (turning the encoder left diminishes the parameter.

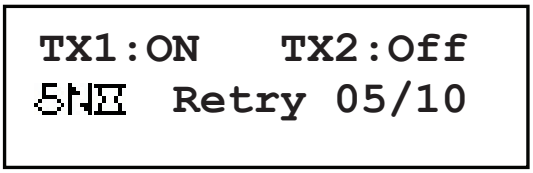
• pushing: push the button once when the cursor is on the name of a menu to enter in that menu, push it when the corsor is on the name of a parameter to enter in modification mode (the cursor starts blinking); after the modification of a parameter, push the button to save the new value.

After having modified the value of a parameter, the cursor goes on blinking for approximately 15 seconds, waiting for confirmation from the user. If the user doesn't confirm the new value (i.e., the button is not pressed), the parameter has not saved and remains on the selected parameter.

The first pressure of the ENCODER when the display is light out, or its rotation, serves in order to activate the retroillumination if disabled.

5.6 Management Firmware

The following is a representation of the main screen, available once you switch on the equipment or when after 180s the encoder is not used, and gives to the user information about the status of the system.



The main screen shows information regards the status of TX and the number of automatic retry, moreover is present an hourglass that indicates:

1. Start time presence, if is the only ⌛ icon present;
2. Exchange time presence, if the ⌛ icon is combined with ⇅ icon.

The ⌀ icon identifies a temporary suspension of the exchange automatism and appears when:

1. The SCM is in ALARM status.
2. One TX is in LOCAL condition.
3. The total number of Retry is 0.
4. The number of makes Retry is the same to the number of total Retry.
5. In Gold configuration the PA connected gives the interlock.

By pressing the encoder you see all the menu available, turning through the "►" symbol you can chooses it and by pressing you can access to its inside. After ~20s you return to the main screen in case the encoder is not used.

```
►General Setting
 TX1     Setting
 TX1     Setting
 Change  Setting
 Function Status
 Soft.   Version
 Exit
```

5.6.1 General Setting

```
 TX1    : ON
 TX2    : OFF
 Change: Normal
 Func.  : AUTO
 Mode   : REMOTE
 Reset  : OK
 IIC    : 10
 Exit
```

TX1	Enables (ON) or disables (OFF) the first transmitter.
TX2	Enables (ON) or disables (OFF) the second transmitter.
Change	Forces the transmitter changeover
Func.	Selects the automatic or manual changeover.
Mode	Enables (REMOTE) or disables (LOCAL) the management from external commands
Reset	Sets at zero the retry counter retraining the changeover
IIC	Specifies the slave address of the equipment on IIC

5.6.2 TX1 Setting and TX2 Setting

```
PgMode: Analog
PowerG: Present
Power : Off
Status: Local
Exit
```

`PgMode` Identifies the modality of the power good state that can be selected from the voices: “Analog”, “Digital”, “AnlAud”, “DigAud”.

`PowerG` Identifies the power good state related to the transmitter filtered from firmware.

`Power` Command to power on or to power off the equipment.

`Status` Shows the status (LOCAL or REMOTE) f the equipment.

5.6.3 Change Setting

```
Retry :  10
Start :05m00s
Before:02m00s
TxOff :02m00s
Coax  :02m00s
After :05m00s
Exit
```

`Retry` indicates the total number of retry before passing in MANUAL from 0 to 50.

`Start` modifies the waiting time to the start from 5 to 60 min.

`Before` modifies the waiting time before beginning the exchange from 1 sec to 30 min.

`TXOff` modifies the waiting time before beginning the switch off of TX from 1 sec to 30 min.

`Coax` modifies the waiting time before beginning the commutation of the coaxial relay from 5 sec to 30 min.

`After` modifies the waiting time before beginning the switch on of TX in antenna from 5 sec to 30 min.

5.6.4 Function Status

```
Load  : Fault
L-Fan : On
InhPa : Disable
IntAud: Normal
ExtAud: Disable
Exit
```

`Load` shows the dummy load status (if enabled).

`L-Fan` shows the status of the fan on the dummy load (if enabled).

`InhPa` shows the status of the inhibit signal supplied from the PA in the Gold configuration (if enabled)

`IntAud` shows the status of the internal audio exchange.

`ExtAud` shows the status of the external audio exchange (if enabled).

5.6.5 Software Version

```
Rel:01010000
Dat:gg/mm/aaaa
Tab:SL1-Test-01
Exit
```

`Rel` shows the firmware release information.

`Dat` shows the release date.

`Tab` shows the table code programmed as default.

6. External Description

This chapter reports the elements of the front and rear panels of the **SCML1+1SL** with a brief description of each of them.

6.1 Front Panel

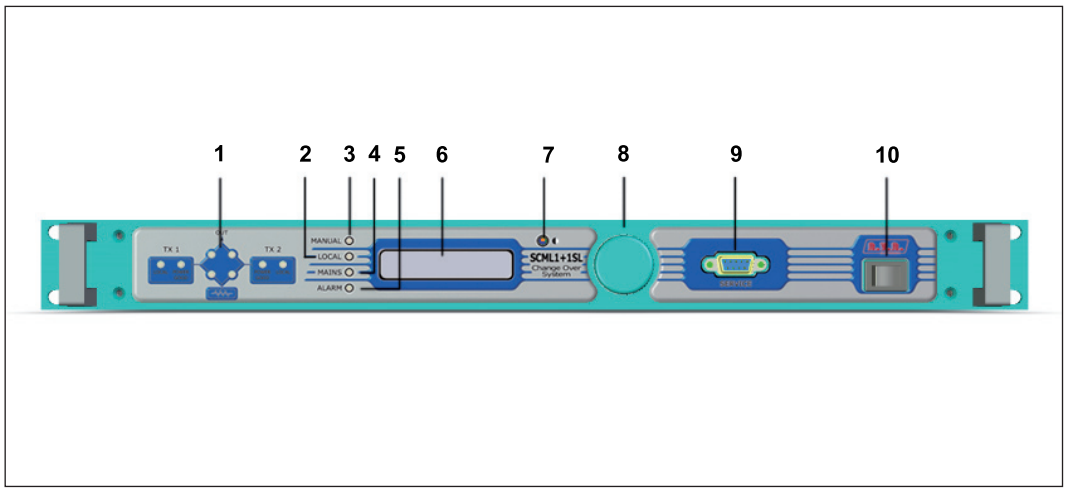


Figure 6.1

[1] SYNOPTIC	Series of LED for the instantaneous vision of the exchange condition. Shows the position of coaxial relay, the state of dummy load and of transmitter connects to it.
[2] MANUAL	Yellow LED, lit when the change-over is set up in order to allow the control exclusively from the customer, inhibiting the automatic management of the equipment functionalities.
[3] LOCAL	Yellow LED, lit when the change-over is set up in order to receive controls exclusively from the encoder, inhibiting any source of telecontrol.
[4] MAINS	Yellow LED, lit when the change-over is supplied at 24V.
[5] ALARM	Red LED, lit when the change-over has had problems during the phase of exchange between the two transmitters.
[6] DISPLAY	Liquid crystals display (2 rows, 16 characters).
[7] CONTRAST	Display contrast adjusting trimmer.
[8] ENCODER	Knob and button in order to software control.
[9] SERVICE	DB9 connector for factory parameters programming (cap. 6.6.3).
[10] POWER	Mains switch.

6.2 Rear Panel SCML1+1SL/V1

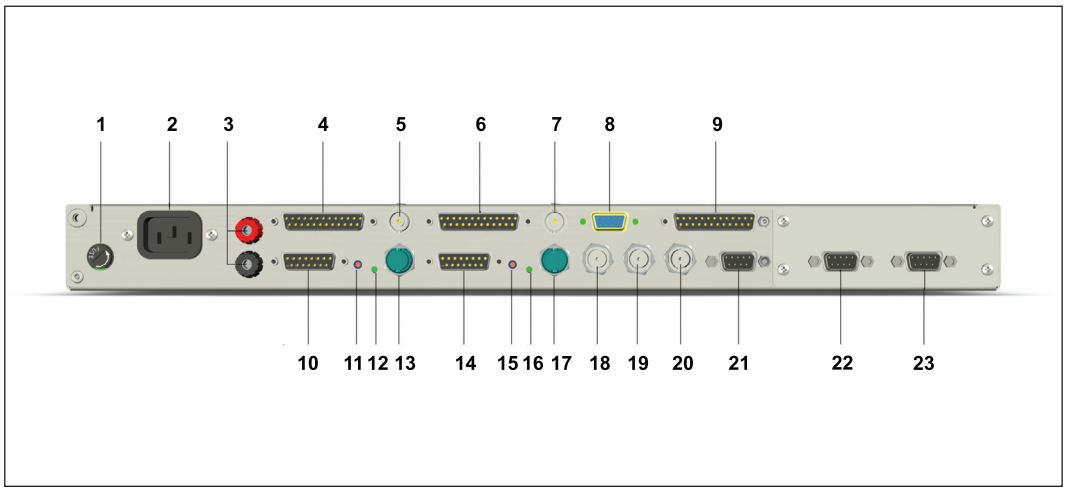


Figure 6.2

[1] MAIN FUSE T1.6
Fuse carrier for the fuse (1.6AT 5x20) for mains supply.

[2] MAINS VOLTAGE
Standard IEC connector for mains supply 110 ÷ 230 V, +10/-15%.

[3] 24VDC Socket for 24Vdc external power supply.

[4] PA1 /HC DB25 connector, for input of TELEMETRY connector coming from an (i.e.: PJ2000M-C) or an hybrid coupler (i.e.:HC2/2) del TX1.

[5] ANALOG IN or FOLDBACK
BNC connector, for the acquisition of an RF signal < 10dBm coming from an RF TEST or for the foldback signal of TX1.

[6] PA2 DB25 connector, for input of TELEMETRY connector coming from an (i.e.: PJ2000M-C) of TX2.

[7] ANALOG IN BNC connector, for the acquisition of an RF signal < 10dBm coming from an RF TEST of TX1.

[8] I^2C DB9 connector for I^2C bus network (cap. 6.6.2).

[9] TC / TS DB25 connector, for the management of main signals of telecontrol and telesignalling (cap. 6.6.1).

[10] EXC1 DB15 connector, for input of REMOTE connector coming from an exciter (i.e.: BLUES30NV) of TX1.

[11] ADJ Trimmer for intervention level adjustment on ANALOG IN signal [5].

[12] PWR GOOD Green Led, lit when the Power Good threshold is passed.

[13] INTERLOCK BNC connector, for the interlock signal coming from transmitter system TX1.

[14] EXC2 DB15 connector, for input of REMOTE connector coming from an exciter (i.e.: BLUES30NV) of TX2.

[15] ADJ Trimmer for intervention level adjustment on ANALOG IN signal [7].

[16] PWR GOOD Green Led, lit when the Power Good threshold is passed.

[17] INTERLOCK BNC connector, for the interlock signal coming from transmitter system TX2.

[18] IN/OUT1 BNC connector, for audio input or output of TX1.

[19] COMMON BNC connector, for audio output or input of common channel.

[20] IN/OUT2 BNC connector, for audio input or output of TX2.

[21] EXT SCM AUD DB9 connector, interface for external audio changeover.

[22] COAX RELAY DB9 connector, for inteconnection with Spinner coaxial relay models BN754067 and BN754098.

[23] DUMMY LOAD DB9 connector, for interconnection with dummy load (cap. 6.6.5).

6.3 Rear Panel SCML1+1SL/V2

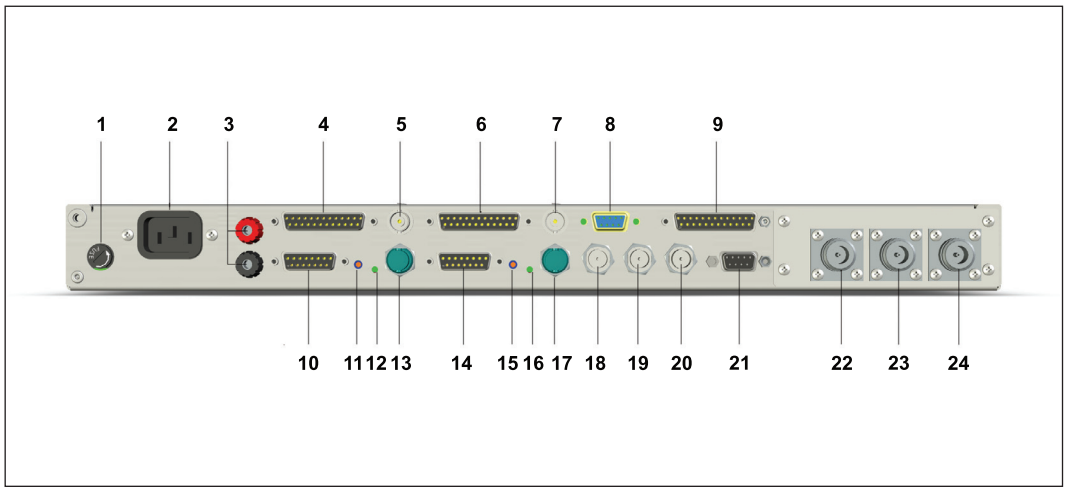


Figure 6.3

[1] MAIN FUSE T1.6
Fuse carrier for the fuse (1.6AT 5x20) for mains supply.

[2] MAINS VOLTAGE
Standard IEC connector for mains supply 110 ÷ 230 V, +10/-15%.

[3] 24VDC — Socket for 24Vdc external power supply.

[4] PA1 /HC — DB25 connector, for input of TELEMETRY connector coming from an (i.e.: PJ2000M-C) or an hybrid coupler (i.e.:HC2/2) del TX1.

[5] ANALOG IN or FOLDBACK
BNC connector, for the acquisition of an RF signal < 10dBm coming from an RF TEST or for the foldback signal of TX1.

[6] PA2 — DB25 connector, for input of TELEMETRY connector coming from an (i.e.: PJ2000M-C) of TX2.

[7] ANALOG IN — BNC connector, for the acquisition of an RF signal < 10dBm coming from an RF TEST of TX1.

[8] I^2C — DB9 connector for I^2C bus network (cap. 6.6.2).

[9] TC / TS — DB25 connector, for the management of main signals of telecontrol and telesignalling (cap. 6.6.1).

[10] EXC1 — DB15 connector, for input of REMOTE connector coming from an exciter (i.e.: BLUES30NV) of TX1.

[11] ADJ — Trimmer for intervention level adjustment on ANALOG IN signal [5].

[12] PWR GOOD — Green Led, lit when the Power Good threshold is passed.

[13] INTERLOCK — BNC connector, for the interlock signal coming from transmitter system TX1.

[14] EXC2 — DB15 connector, for input of REMOTE connector coming from an exciter (i.e.: BLUES30NV) of TX2.

[15] ADJ — Trimmer for intervention level adjustment on ANALOG IN signal [7].

[16] PWR GOOD — Green Led, lit when the Power Good threshold is passed.

[17] INTERLOCK — BNC connector, for the interlock signal coming from transmitter system TX2.

[18] IN/OUT1 — BNC connector, for audio input or output of TX1.

[19] COMMON — BNC connector, for audio output or input of common channel.

[20] IN/OUT2 — BNC connector, for audio input or output of TX2.

[21] EXT SCM AUD — DB9 connector, interface for external audio changeover.

[22] ANT — N-type connector, for RF output toward antenna.

[23] TX1 — N-type connector, for RF input coming from TX1.

[24] TX2 — N-type connector, for RF input coming from TX2.

6.4 Rear Panel SCML1+1SL/V3

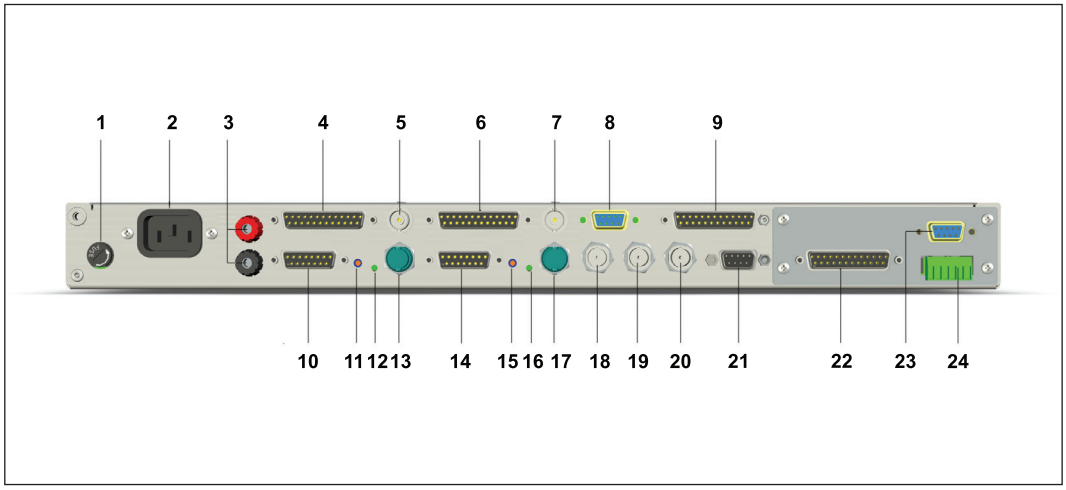


Figure 6.4

[1] MAIN FUSE T1.6
Fuse carrier for the fuse (1.6AT 5x20) for mains supply.

[2] MAINS VOLTAGE
Standard IEC connector for mains supply 110 ÷ 230 V, +10/-15%.

[3] 24VDC Socket for 24Vdc external power supply.

[4] PA1 /HC DB25 connector, for input of TELEMETRY connector coming from an (i.e.: PJ2000M-C) or an hybrid coupler (i.e.:HC2/2) del TX1.

[5] ANALOG IN or FOLDBACK
BNC connector, for the acquisition of an RF signal < 10dBm coming from an RF TEST or for the foldback signal of TX1.

[6] PA2 DB25 connector, for input of TELEMETRY connector coming from an (i.e.: PJ2000M-C) of TX2.

[7] ANALOG IN BNC connector, for the acquisition of an RF signal < 10dBm coming from an RF TEST of TX1.

[8] I^2C DB9 connector for I^2C bus network (cap. 6.6.2).

[9] TC / TS DB25 connector, for the management of main signals of telecontrol and telesignalling (cap. 6.6.1).

[10] EXC1 DB15 connector, for input of REMOTE connector coming from an exciter (i.e.: BLUES30NV) of TX1.

[11] ADJ Trimmer for intervention level adjustment on ANALOG IN signal [5].

[12] PWR GOOD Green Led, lit when the Power Good threshold is passed.

[13] INTERLOCK BNC connector, for the interlock signal coming from transmitter system TX1.

[14] EXC2 DB15 connector, for input of REMOTE connector coming from an exciter (i.e.: BLUES30NV) of TX2.

[15] ADJ Trimmer for intervention level adjustment on ANALOG IN signal [7].

[16] PWR GOOD Green Led, lit when the Power Good threshold is passed.

[17] INTERLOCK BNC connector, for the interlock signal coming from transmitter system TX2.

[18] IN/OUT1 BNC connector, for audio input or output of TX1.

[19] COMMON BNC connector, for audio output or input of common channel.

[20] IN/OUT2 BNC connector, for audio input or output of TX2.

[21] EXT SCM AUD DB9 connector, interface for external audio changeover.

[22] COAX RELAY DB9 connector, for inteconnection with Spinner coaxial relay models BN512690, BN640075 and BN941912.

[23] DUMMY LOAD DB9 connector, for interconnection with dummy load (cap. 6.6.5).

[24] COAX OFF POSITION
Phoenix connector, with out position contacts.

6.5 Rear Panel SCML1+1SL/V4

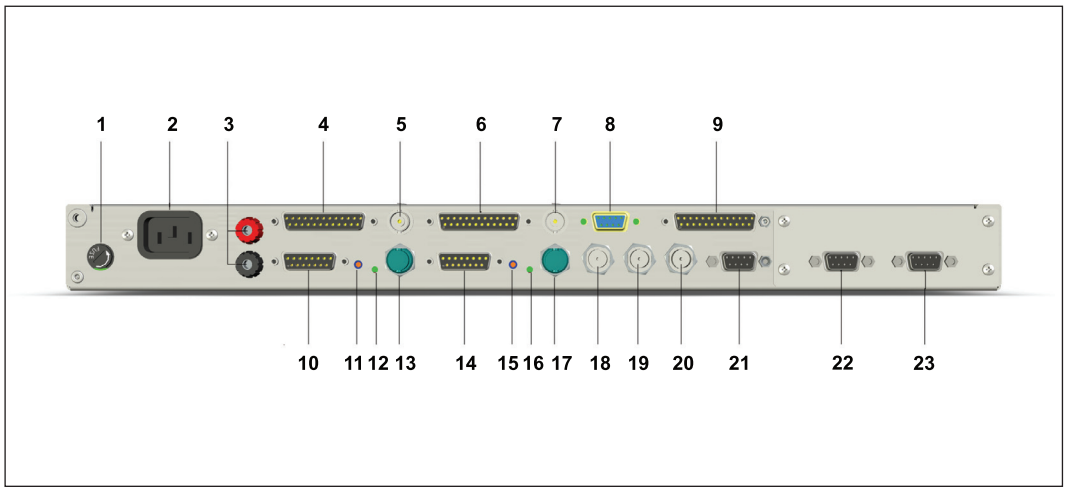


Figure 6.5

[1] MAIN FUSE T1.6
Fuse carrier for the fuse (1.6AT 5x20) for mains supply.

[2] MAINS VOLTAGE
Standard IEC connector for mains supply 110 ÷ 230 V, +10/-15%.

[3] 24VDC Socket for 24Vdc external power supply.

[4] PA1 /HC DB25 connector, for input of TELEMETRY connector coming from an (i.e.: PJ2000M-C) or an hybrid coupler (i.e.:HC2/2) del TX1.

[5] ANALOG IN or FOLDBACK
BNC connector, for the acquisition of an RF signal < 10dBm coming from an RF TEST or for the foldback signal of TX1.

[6] PA2 DB25 connector, for input of TELEMETRY connector coming from an (i.e.: PJ2000M-C) of TX2.

[7] ANALOG IN BNC connector, for the acquisition of an RF signal < 10dBm coming from an RF TEST of TX1.

[8] I2C DB9 connector for I2C bus network (cap. 6.6.2).

[9] TC / TS DB25 connector, for the management of main signals of telecontrol and telesignalling (cap. 6.6.1).

[10] EXC1 DB15 connector, for input of REMOTE connector coming from an exciter (i.e.: BLUES30NV) of TX1.

[11] ADJ Trimmer for intervention level adjustment on ANALOG IN signal [5].

[12] PWR GOOD Green Led, lit when the Power Good threshold is passed.

[13] INTERLOCK BNC connector, for the interlock signal coming from transmitter system TX1.

[14] EXC2 DB15 connector, for input of REMOTE connector coming from an exciter (i.e.: BLUES30NV) of TX2.

[15] ADJ Trimmer for intervention level adjustment on ANALOG IN signal [7].

[16] PWR GOOD Green Led, lit when the Power Good threshold is passed.

[17] INTERLOCK BNC connector, for the interlock signal coming from transmitter system TX2.

[18] IN/OUT1 BNC connector, for audio input or output of TX1.

[19] COMMON BNC connector, for audio output or input of common channel.

[20] IN/OUT2 BNC connector, for audio input or output of TX2.

[21] EXT SCM AUD DB9 connector, interface for external audio changeover.

[22] COAX RELAY DB9 connector, for link with external Interconnection Box Esterna (cap. 6.6.4).

[23] DUMMY LOAD DB9 connector, for interconnection with dummy load (cap. 6.6.5).

6.6 Connectors Description

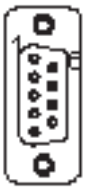
6.6.1 Remote

Type: Female DB25

Pin	Name
1	+15V
2	+15V
3	TX1 Antenna (TC)
4	TX2 Antenna (TC)
5	TX1 ON (TC)
6	TX1 OFF (TC)
7	TX2 ON (TC)
8	TX2 OFF (TC)
9	AUTO (TC)
10	MANUAL (TC)
11	RESET (TC)
12	COMMON (TC)
13	GND
14	COMMON (TS)
15	TX1 Antenna (TS)
16	TX2 Antenna (TS)
17	TX1 OFF (TS)
18	TX1 ON (TS)
19	TX2 OFF (TS)
20	TX2 ON (TS)
21	MANUAL (TS)
22	AUTO (TS)
23	LOCAL (TS)
24	REMOTE (TS)
25	COMMON (TS)

6.6.2 I^2C Bus

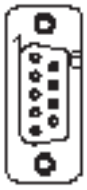
Type: Female DB9



1	NC
2	SDA
3	SCL
4	NC
5	GND
6	Reserved
7	Reserved
8	NC
9	NC

6.6.3 Service (**only for factory setting purposes**)

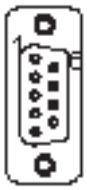
Type: Female DB9



1 NC
2 TX_D
3 RX_D
4 Internally connected with 6
5 GND
6 Internally connected with 4
7 Internally connected with 8
8 Internally connected with 7
9 NC

6.6.4 Coax Relay (**only for SCML1+1SL/V4**)

Type: Female DB9



1 Control voltage (+)
2 Control voltage (-)
3 Relay in position 1 (OFF)
4 Relay in position 2 (ON)
5 GND
6 Switching to position 2 / NO
7 Switching to position 1 / NC
8 Common (when selected)
9 Relay Switching

Pins 1 and 2 are outputs on which the relay control voltage is made available (12V or 24V DC); both contacts are floating as compared to all of the other positive or negative voltages.

Connected to pins 3 and 4 are the relay limit switches, two contacts which alternately close towards the ground when the relay is in the normal position (TX1 connected to antenna, pin 3 closed to ground) or switched (TX2 connected to antenna, pin 4 closed to ground).

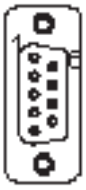
Pins 6 and 7 are the commands which cause the coaxial relay to switch from the normal position (Off) to the switched position (On) and vice versa; the type of command depends on the coaxial relay used, as well as the connecting cable between the SCM and the coaxial relay.

One of the possible positions of the control mode selection jumper makes available on pin 8 the common contact of a switch, of which pin 6 is the normally open (NO) contact and pin 7 is the normally closed (NC) contact.

Pin 9 is an open contact until switching begins, and is closed to ground when the relay has reached the new position.

6.6.5 Dummy Load

Type: Female DB9



1	Relay (24V / 0,5A) for the fan control of the dummy load / NO
2	Relay (24V / 0,5A) for the fan control of the dummy load / C
3	Relay (24V / 0,5A) for the fan control of the dummy load / NC
4	+15V
5	GND
6	Input(1) for the Fault control of the dummy load (temperature) +/-
7	Input(1) for the Fault control of the dummy load (temperature) +/-
8	Not Connected
9	Not connected

(1): An optoinsulator can be present between pin 6 and 7 as alternative.

6. Technical Specifications

6.1 Electrical characteristics

Generals

AC Power supply	110÷230 V +10/-15%, full range
DC Power supply	24V
Weight	About 6.5 kg (depends on the version)
Dimension	1unit 19”rackmounted (483 x 44 x 390 mm)
Operating temperature	-10° C to +50° C
Maximum relative humidity	95%, without condensing

Inputs

TX1 / TX2	2x 15 pin sub-D connector for interconnection with RVR exciters
TX1 PA / TX2 PA	2x 25 pin sub-D connector for interconnection with RVR Power Amplifier or Hybrid Coupler
ANALOG IN	2x BNC unbalanced for interconnection with equiment non-RVR
IN/OUT	BNC unbalanced. MPX input for changeover

Outputs

Ext Audio	9 pin sub-D connector for external audio changeover
TX1 MPX / TX2 MPX	2x BNC unbalanced. MPX output for TX1 and TX2 transmitters
Interlock	2x BNC unbalanced to inhibit the exciter in changeover

Interface

I2C Bus	9 pin sub-D connector for I2C bus networking
TC/TS	25 pin sub-D connector for telecontrol and telesignal

Versions

\V1	Version with external relay (N-type connector from 150W up to 1000W)
\V2	Version with internal relay (N-type connector up to 150W)
\V3	Version with external relay (7/16”, 7/8” or 1+5/8” connectors over 1000W)
\V4	Version with external customized relay

Software times

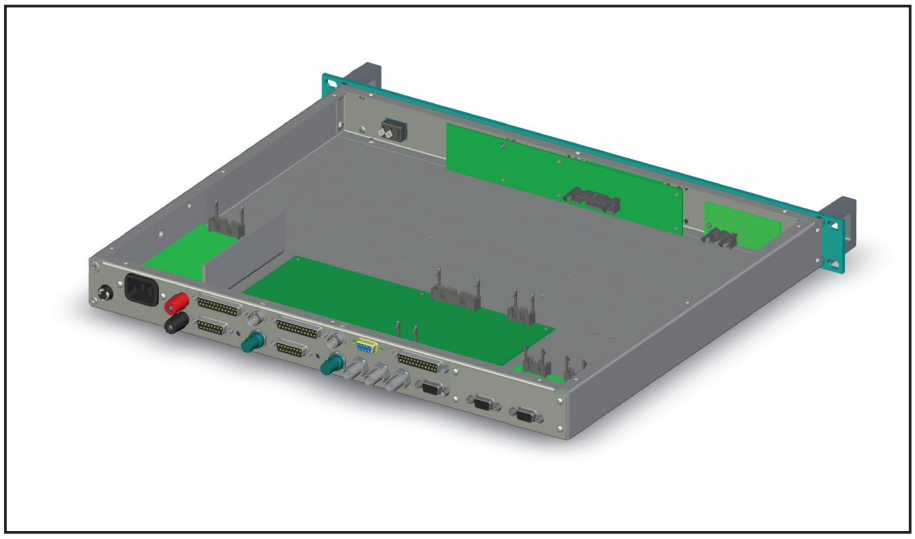
Base of times	~ 10 ms
Base of the times for the timer	~ 100 ms
Δt before entering in the main cycle to the start	~ 450 ms

Main cycle	~ 3 ms
Display Updating	~ 27 ms
Minimum lenght of a pulse referred to TxOn and TxOff relays	~ 300 ms

7. Internal Description

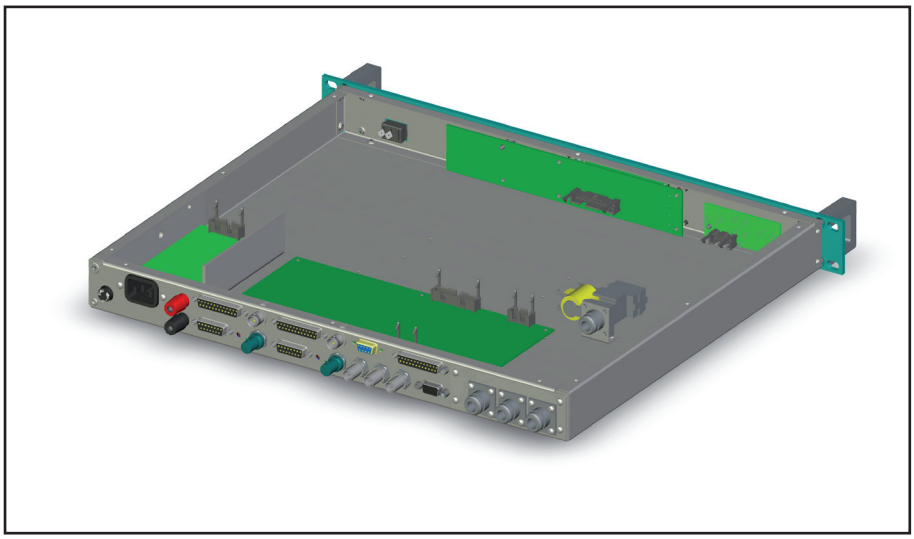
Following is a brief description of the different boards included in each changeover version.

7.1 SCML1+1SL/V1



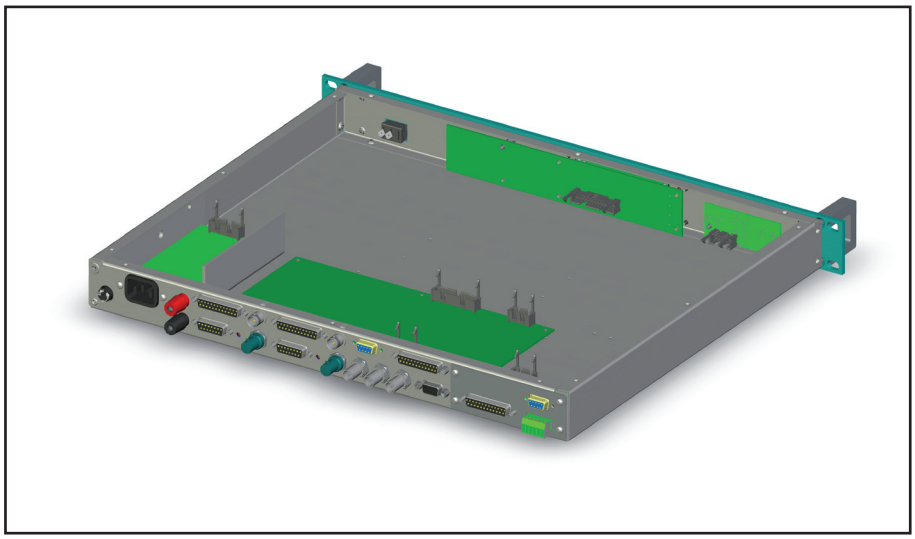
- SL125MA1002 (Main Board)
- SL125PC1001 (Synoptic Panel Board)
- SL125PC2001 (Panel Board)
- FLYRXRL1U (Power Supply)
- SL125IN2001 (DB9 External Relay Interface)

7.2 SCML1+1SL/V2



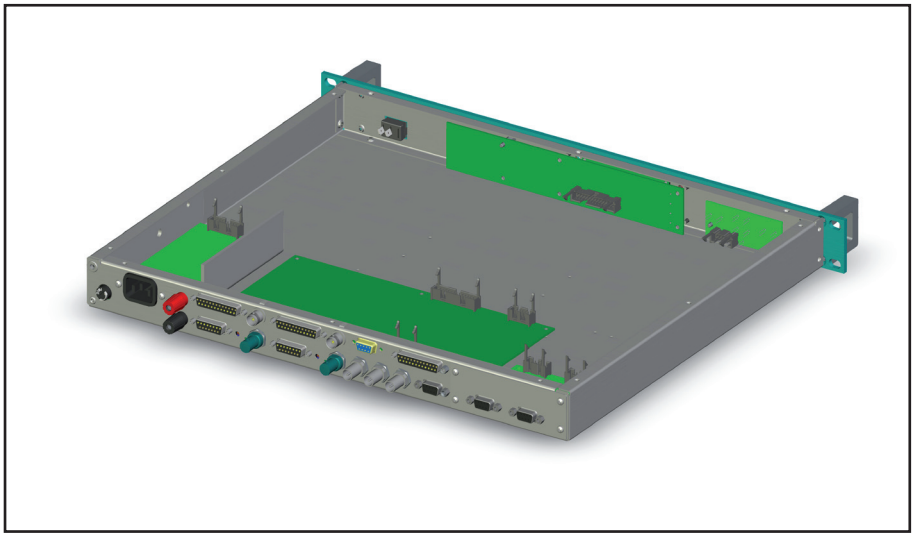
- SL125MA1002 (Main Board)
- SL125PC1001 (Synoptic Panel Board)
- SL125PC2001 (Panel Board)
- FLYRXRL1U (Power Supply)
- Internal Coaxial Relay

7.3 SCML1+1SL/V3



- SL125MA1002 (Main Board)
- SL125PC1001 (Synoptic Panel Board)
- SL125PC2001 (Panel Board)
- FLYRXRL1U (Power Supply)
- SL125IN1001 (DB25 External Relay Interface)

7.4 SCML1+1SL/V4



- SL125MA1002 (Main Board)
- SL125PC1001 (Synoptic Panel Board)
- SL125PC2001 (Panel Board)
- FLYRXRL1U (Power Supply)
- SL125IN2001 (DB9 External Relay Interface)

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